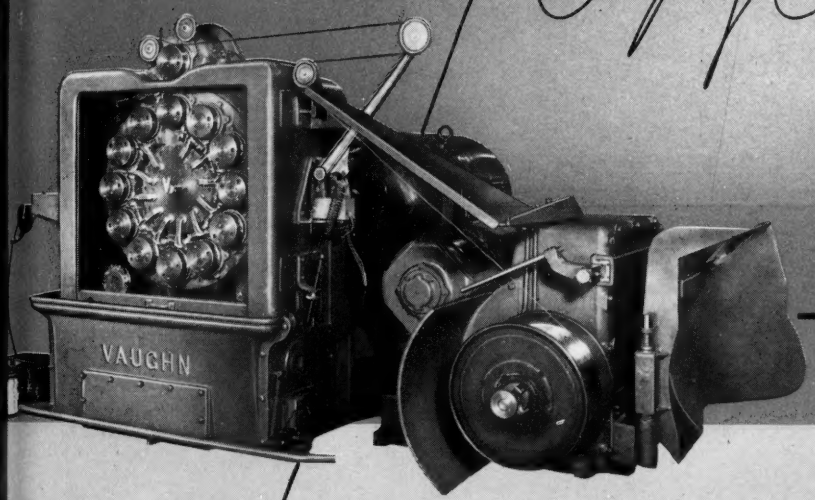
WIRE AND WIRE PRODUCTS

NOVEMBER 1956



Wire

FROM THE

VERY BEST

CIRCLES

—for your most exacting needs!

VAUGHN®

RINGBLOX®

Yes, Vaughn RINGBLOX run in circles to bring you faster production of ferrous and non-ferrous wire! Your most demanding schedules for intermediate and fine size are maintained dependably by these popular continuous machines—write us for the facts!

"Quick on the Draw!"

The VAUGHN MACHINERY CO. CUYAHOGA FALLS, OHIO, U.S.A.

COMPLETE COLD DRAWING EQUIPMENT—Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys

OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

PICK Payoffpak®

in fibre

or steel

whichever is best for you

PAYOFFPAK FIBRE DRUM

PAYOFFPAK STEEL PAIL

The Payoffpak system is the easiest, cheapest way to pack, ship, store and use wire. Make it yours—in fibre or steel, or both.

ONLY CONTINENTAL GIVES THIS CHOICE OF PACKAGING FOR WIRE

Now you can use the Payoffpak system of loading and shipping wire . . . and, for smaller units, you can choose a fibre or a steel package, whichever best meets your requirements. Our steel Payoffpak pails give airtight protection, have sturdy bails and necked-in bottoms for secure stacking. Along with rugged construction, our fibre Payoffpaks offer the economy that goes with light weight. Smaller size has handy handles. Also available in various larger sizes.

With Payoffpak, wire is loaded directly into the shipping container as it is drawn or coated . . . laborious operations of splitting, tying and wrapping are eliminated. Payoffpaks can be beautifully decorated to become a traveling advertisement for you.

CONTINENTAL CAN COMPANY

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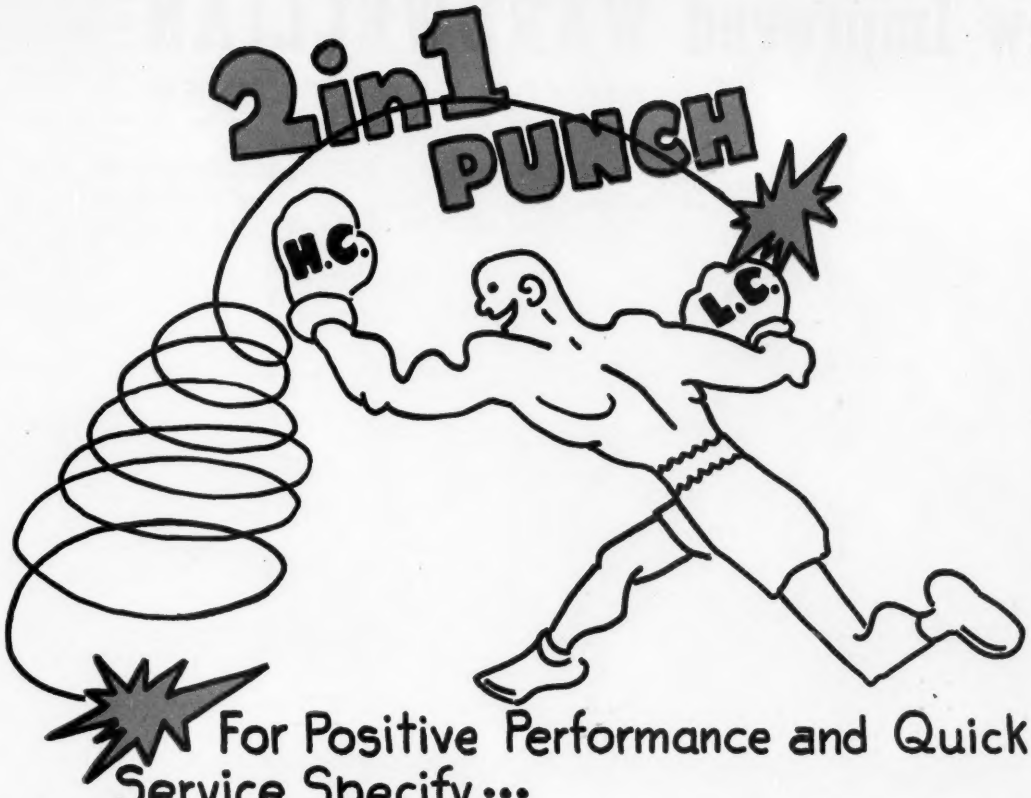

For Positive Performance and Quick Service Specify ...

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HAVE YOU INVESTIGATED

Standard 55?

More Rope Wire Is Drawn Thru Standard No. 55 Than All The Rest of the Wire Drawing Lubricants Combined.

Standard No. 55 Has Numerous Other Splendid Applications—May We Show You Why?

Standard Industrial has pioneered in most of the outstanding contributions to better wire drawing through better lubricants. Consult Standard Industrial for the solution of your difficult problems.

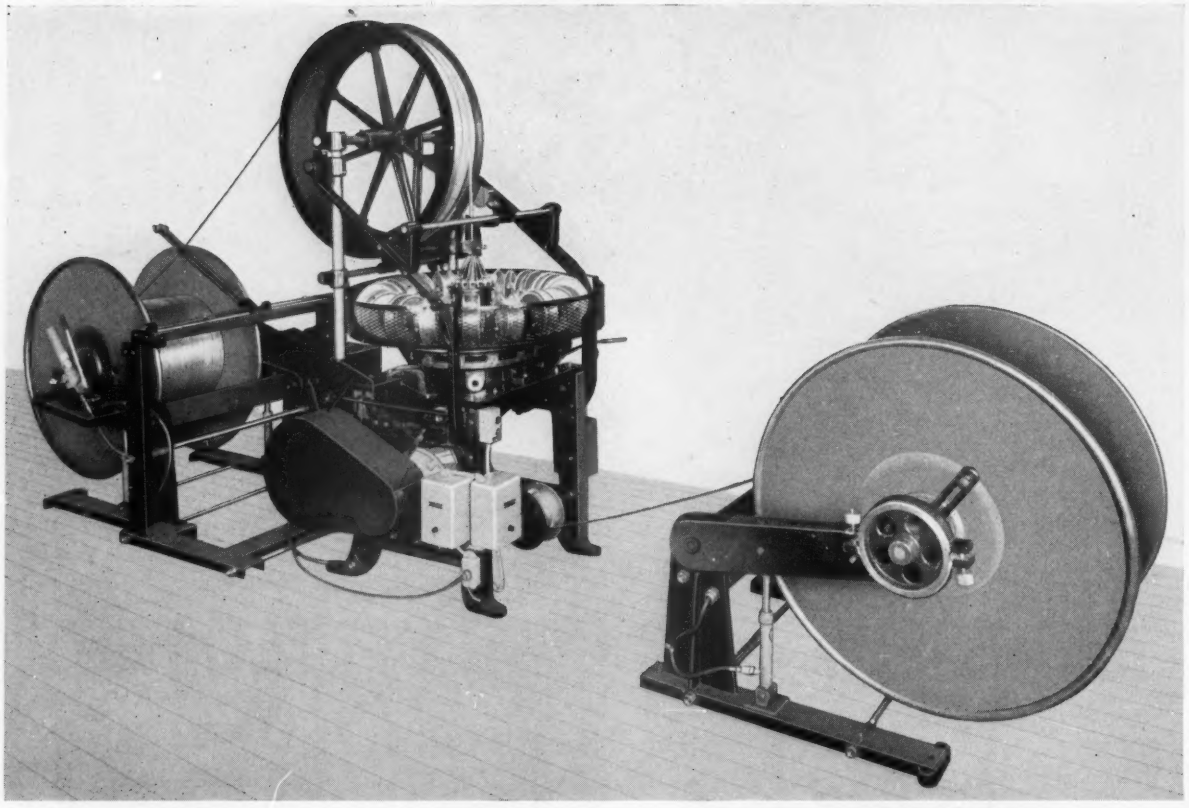
Standard Industrial COMPOUNDS CO., INC.
FRANKFORT, ILLINOIS
(A suburban Chicago area city)
TELEPHONES: 2131 — 2141

New Improved WARDWELLIAN®

ARMOR WIRE SERVER

TYPE M-E

Applies multiple ends of wire to electrical conductors — for underground distribution cable and other applications



- For production of underground distribution cable: eighteen ends of flat wire, .009 x .047, can be applied at the rate of 250 inches per minute.
- Equipped with individual tensioning device for each package, thus assuring a uniform product.
- Electric stop-motion operates upon breakage or exhaustion of wire at each supply package.
- Machine will accommodate eighteen ten-pound packages of .009 x .047 wire.
- Capstan 36" diameter, 6" face.
- Standard set of twelve change-gears furnished with each machine.
- Machine driven by 2 HP motor.
- New design pay off stand and windup stand as illustrated for accommodating reels from 30" to 48" in diameter. Maximum weight of full reel 5000 pounds.
- Reels raised and lowered hydraulically on both pay off stand and windup stands.
- Pay off stand equipped with adjustable friction-control for desired tension delivery.
- Windup stand equipped with adjustable traverse mechanism.
- Windup stand operated by individual motor through fluid-drive to insure constant rate of draft.
- Machine can be adapted for applying textile coverings with yarn, glass, and various types of synthetics. Copper wire and wires of similar nature can also be applied to other conductors.
- **Pay off stand and windup stand can be furnished separately or in pairs for use with other types of equipment.**

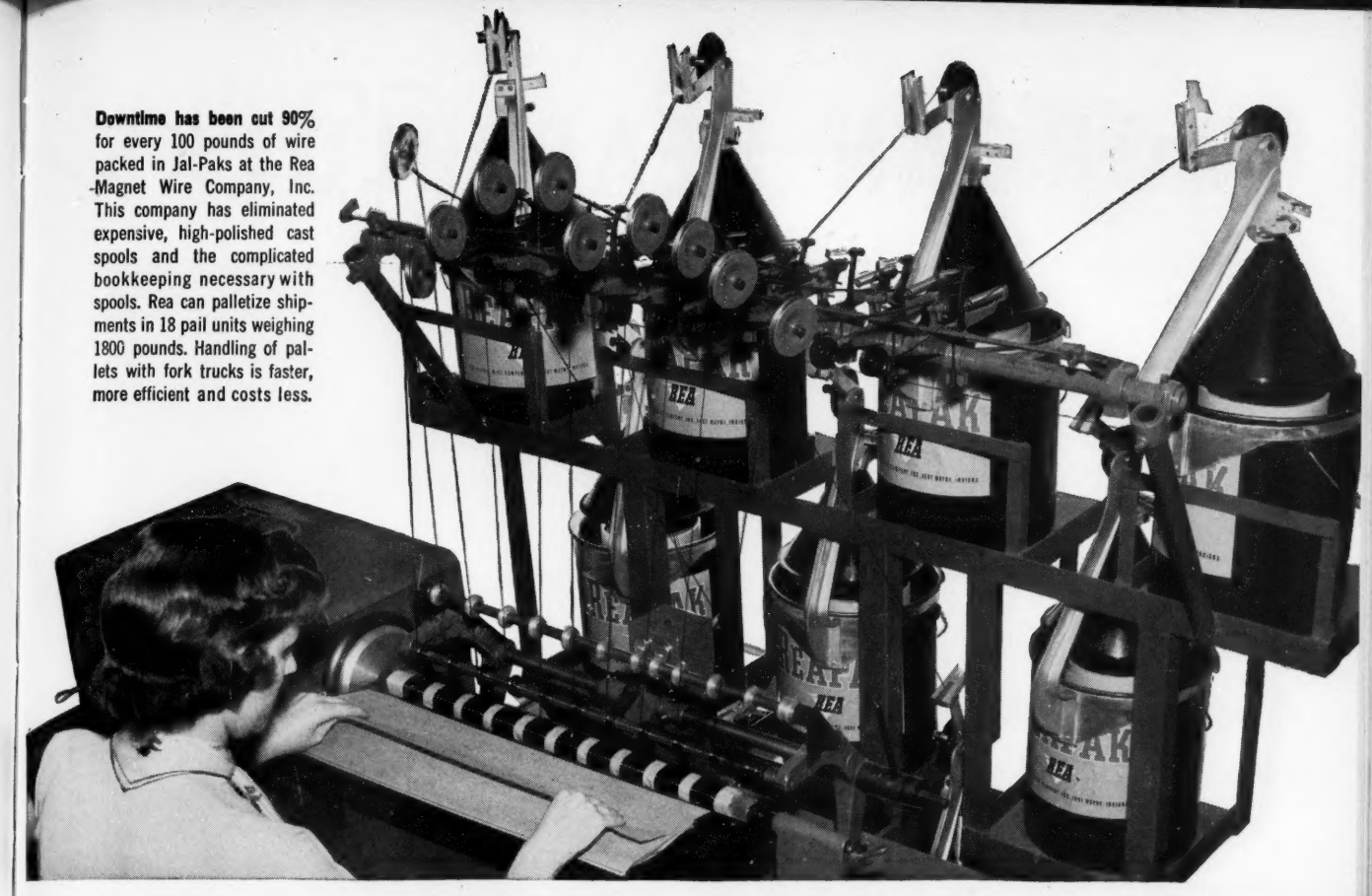
Complete information available on request

WARDWELL Braiding Machine Co.

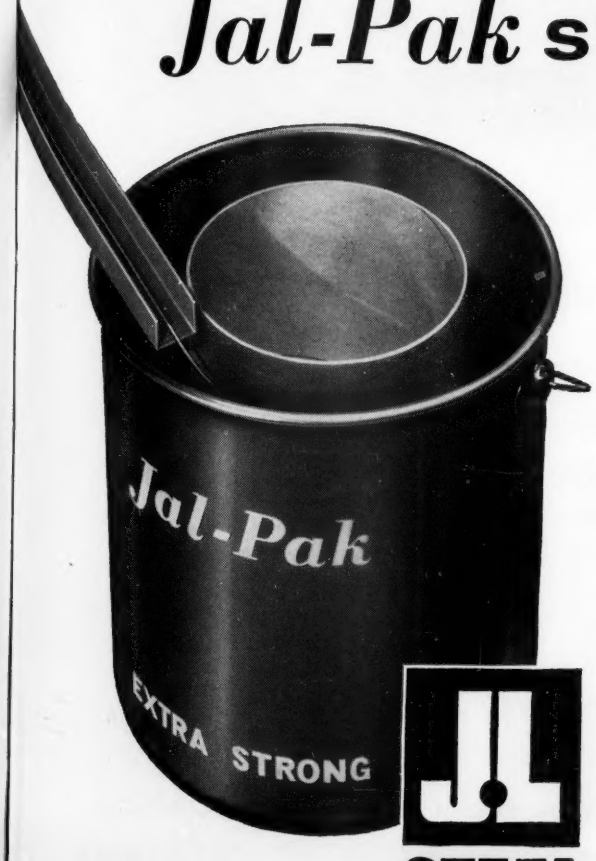
Central Falls
Rhode Island, U.S.A.

Representatives for Europe, British Colonies and Dependencies
JAMES MACKIE & SONS, LTD., BELFAST, IRELAND

Downtime has been cut 90% for every 100 pounds of wire packed in Jal-Paks at the Rea Magnet Wire Company, Inc. This company has eliminated expensive, high-polished cast spools and the complicated bookkeeping necessary with spools. Rea can palletize shipments in 18 pail units weighing 1800 pounds. Handling of pallets with fork trucks is faster, more efficient and costs less.



Jal-Pak STEEL WIRE PAILS



improve wire packaging 3 ways...

FASTER PACKAGING results due to advanced design of Jal-Pak. Downtime is reduced as much as 90%. No rethreading, replacing or rejoining is necessary. Rigid cylindrical cores of steel or fiber lower your investment. No deposit or return is required.

BETTER PRODUCT IDENTIFICATION with Jal-Pak pails increases consumer acceptance. Bright colorful pails stand out in storage racks. Product name is readable at a distance.

COMPLETE PROTECTION is assured by this steel pail with exclusive rolled, smooth, side seams and smooth surfaces with no obstructions to cause snarling or kinking. Tight closures eliminate deterioration in storage.

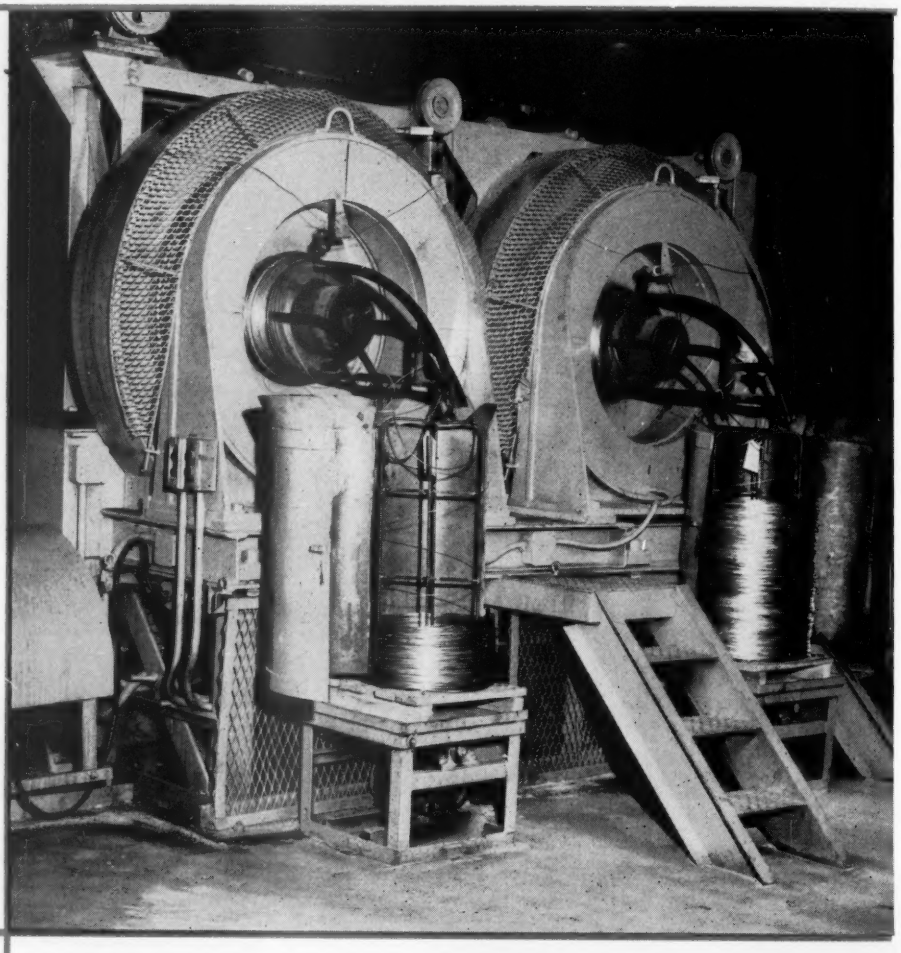
Jal-Pak wire pails are now available for brass, copper, steel, aluminum, stainless steel, alloys, welding and soldering wires.

For facts on how Jal-Pak can increase production and sell more wire for you, call your nearby J&L representative, or write direct to the Container Division.

Jones & Laughlin
STEEL CORPORATION · PITTSBURGH
Container Division
405 Lexington Avenue, New York 17, N.Y.

J&L STEEL

MORGAN DEAD BLOCKS



MORGAN
DEAD BLOCK
GALVANIZING
TAKE-UP FRAME

. . . used as Galvanizing Take-Up Frame

SAFE — Blocks are nonrotating.

AUTOMATIC — Wire automatically delivered to stems.

INCREASED PRODUCTION — 100% increase in speeds where pans permit.

LARGE BUNDLES — Will deliver to stationary stems.

WIDE RANGE — Built for wide range of wire sizes.

MORGAN Dead Blocks are available for wire drawing at wire drawing speeds.

MORGAN CONSTRUCTION CO.

WORCESTER, MASSACHUSETTS, U. S. A.

WM98

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WIRE AND WIRE PRODUCTS*

Reg. U. S. Pat. Off.

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable.

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 31 November, 1956 No. 11

Designated as Official Publication By The Wire Association

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PB-120-T Box and Skid Unit equipped with tiering lugs.

REPUBLIC STEEL

Boxes and Skids

For Handling Wire and Wire Products

Design and construction features of Republic Boxes and Skids help speed movement of materials, conserve storage space, produce savings in all phases of materials handling. Fabricated from heavy-gage steel sheets, they feature deep reinforcing ribs for maximum strength and rigidity.

Units like the PB-120-T, shown above, are manufactured in a wide range of sizes. Republic Materials Handling Engineers will be happy to work with you in designing boxes and skids to meet your specific requirements. There is no cost or obligation for their service.

Write for Catalog 620 on the complete line of Republic Materials Handling Equipment.

REPUBLIC STEEL CORPORATION
Pressed Steel Division
6102 Truscon Avenue, Cleveland 27, Ohio

( ) Please send Catalog 620.
( ) Have an Engineer call.

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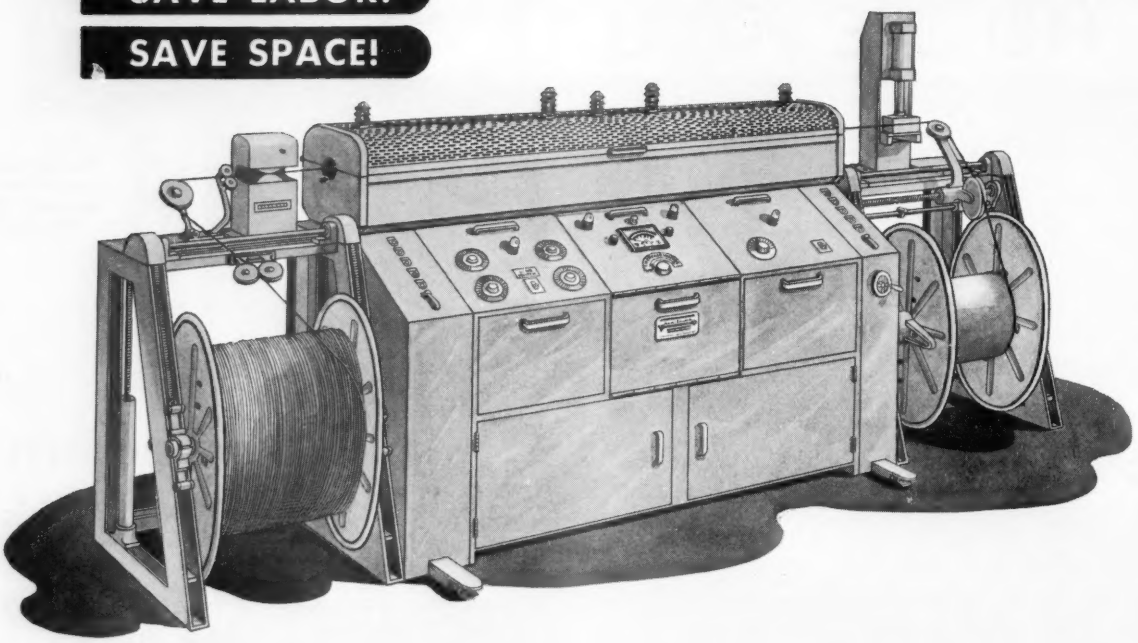
SAVE LABOR!
SAVE SPACE!



AUTOMATIC RE-SPARKER, Class Q

METHOD OF OPERATION:

- Faulty reel of wire is power-lifted into pay-off stand.
- "Run" button is pressed, machine starts slowly and then accelerates with controlled torque to about 2,000fpm. This controlled acceleration and torque prevent the overstressing of small wires, and, together with automatic reversing, are accomplished without the use of D.C. converters and motors.
- When the Sparker locates a fault, the machine comes to a quick, smooth stop under control of heavy, electric brakes on both pay-off and take-up ends to prevent any slacking or overstressing of wire during deceleration.
- During deceleration, the main motor drive is disconnected from the reels and continues to rotate.
- When machine comes to full stop, it automatically reverses, slowly bringing fault back to the Tester where it is detected in the first few inches of the Electrode Unit and easily located for patching on the adjacent press.
- A new ball bearing screw traverse, reducing friction and wear to a minimum, affords consistently smoother and more precise operation than has ever before been achieved.

This revolutionary new machine for the first time affords complete re-sparking equipment in an integral unit.

The machine, combining Wire Sparker, Pay-Off and Take-Up Reel Stands with Power Lift, Measuring Machine, Counters, and optional Patching Press, is designed for re-locating and patching faults in the insulation of wire from an extruding machine, either plastic or rubber.

The physical layout of the machine, with its front, aisle-loading feature, allows a saving of more than 50% of the floor space required by former JLE separate-unit equipment.

Its automatic devices and compact arrangement permit one man to operate up to five units as against a present operating capability of two automatics or one non-automatic machine.

Write, phone or cable for Catalog Section 3A-W1156 giving full details.

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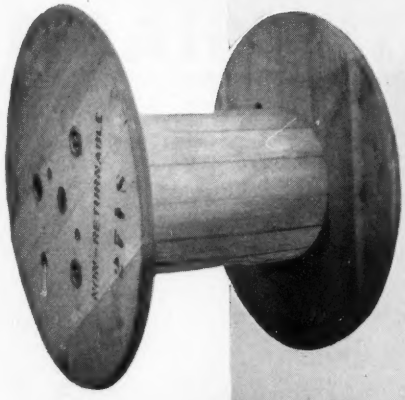
SAVE your company more!!!

SERVE your customers better!!!



the **NARCO**
NON-RETURNABLE

An expendable package — light in weight, soundly engineered and **LOW IN COST.** Save costly freight, expensive reel maintenance, valuable plant space. Serve without the inconvenience and expense of deposits to yourself **and** your customer.

the **NARCO**
METAL BOUND

A returnable package — lasts **FOUR TO SIX TIMES** as long as all wood reels. For applications where a non-returnable cannot be used. This durable reel requires no maintenance and is lighter than comparable all wood reels. Superior service and satisfied customers.

Remember — THESE ARE PRODUCTS OF THE MOST MODERN UP-TO-DATE REEL PLANT IN THE WORLD (MANUFACTURED BY A COMPANY WITH NEARLY 50 YEARS EXPERIENCE); A BACKGROUND OF EXHAUSTIVE TESTING AND RESEARCH IN THE LABORATORY AND THE FIELD.

PARDON OUR ENTHUSIASM ON THIS ONE!

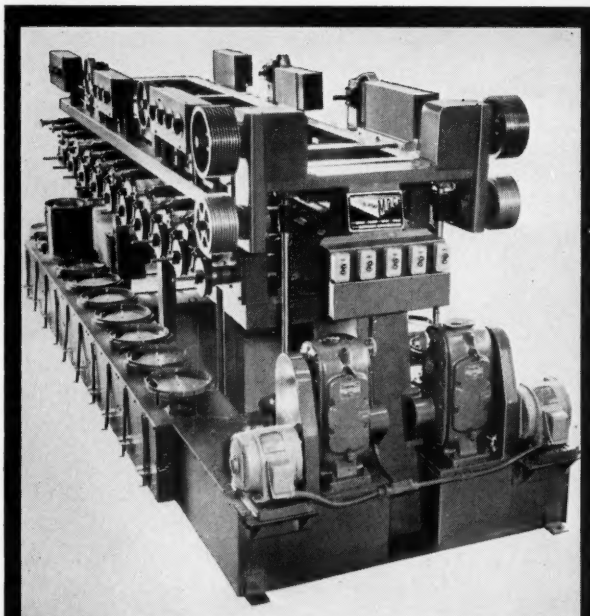
Last month we told you about this new MOCO Machine

In our enthusiasm, we said it turns out "*over a mile-per-hour of heavy rounds and rectangulars.*"

Of course no machine — not even this revolutionary new Moco — can apply 2 servings of glass or yarn and 4 coats of baked insulating varnish at *that* high rate. However —

It *does* turn out heavy rounds and rectangulars so fast that we feel you'll agree with us it's hard *not* to exaggerate!

NEW

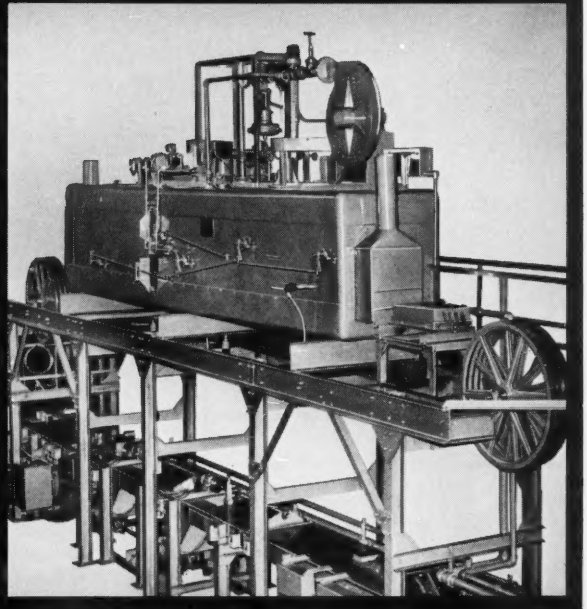


New Reel-R-Drum Packer handles two wire sizes simultaneously at different speeds through the same process.

MOCO's new Reel-R-Drum Packer is setting production records in forward-looking companies. This versatile unit has a speed range from 20 to 120 feet per minute. You can produce two wire sizes simultaneously through the same process at different speeds. Handling wire sizes ranging from .0089" to .025" in diameter, this MOCO Reel-R-Drum packages annealed copper magnet wire on different reels or in nominal 100 lb. capacity Payoffpak Drums, or both simultaneously. This versatile unit is built for tandem operation with a high speed MOCO type "C" wire enameling machine.

New MOCO Machine applies 2 servings of glass or yarn and 4 coats of baked insulating varnish

Satisfied users acclaim this new insulating, impregnating and varnish baking machine as a completely revolutionary development in the field of wire enameling. It is capable of turning out large quantities of heavy rounds and rectangulars (up to 150 M. Sq. Mls. Cross Sectional Area), baking on 4 coats of insulating varnish and applying two servings of glass or textile yarns . . . simultaneously! MOCO's revolutionary Rapid-Cool Oven lets you stop production without damage to wire in the oven. Return to full production in a matter of seconds because of the rapid rise of the temperature inside this MOCO Tunnel Oven.



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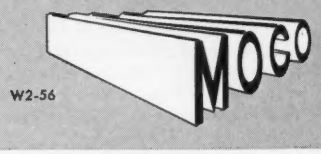

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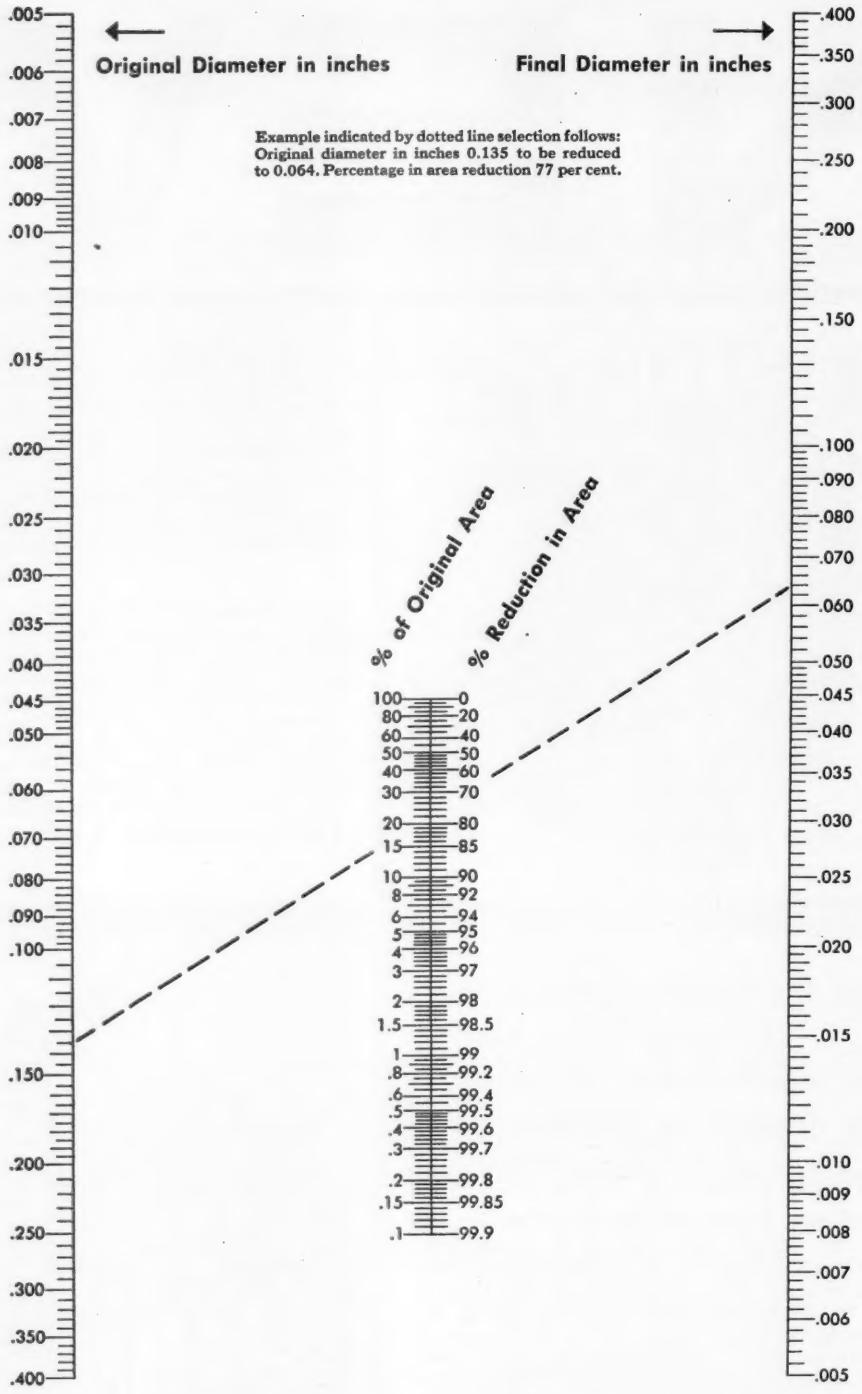

ALUMINUM WIRE DRAWING NOMOGRAPH

This aluminum wire drawing nomograph gives you a simplified method of calculating area reduction in per cent. We hope it will aid you in your work. Keep it handy for ready everyday reference.

For immediate service and information call the Kaiser Aluminum sales office listed in your telephone directory. Or write to Kaiser Aluminum & Chemical Sales, Inc., *General Sales Office,* Palmolive Bldg., Chicago 11, Illinois; *Executive Office,* Kaiser Bldg., Oakland 12, California.

Kaiser Aluminum

Manufacturers Wire • Rivet Wire and Rod • Welding Wire • Redraw Wire & Rod • Spooled Fine Wire • EC (Electrical Conductor Grade) Wire

See "THE KAISER ALUMINUM HOUR." Alternate Tuesdays, NBC Network. Consult your local TV listing.

FOR SUPERIOR INSULATION AND JACKETING CHOOSE ALATHON® POLYETHYLENE RESIN

Jacketing of ALATHON®
— for greater durability
— for abrasion resistance
SHIELD
Insulation of ALATHON® for high dielectric strength and heat resistance

The unique properties of ALATHON polyethylene resins make them suitable for both jacketing and insulating applications. Jacketing of black ALATHON withstands conditions of heat, moisture, and weather extremes — assures years of trouble-free service. ALATHON absorbs the shocks of rough handling and thereby speeds installation.

The electrical properties of ALATHON polyethylene resins are excellent. Their low power factor and dielectric constant remain essentially unchanged over a wide range of frequencies and temperatures. Their moisture resistance and lightness of weight make them eminently suitable for insulating applications.

A complete family of ALATHON polyethylene resin compositions is offered by the Du Pont Polychemicals Department. For the compound best suited to your particular use, send for complete details by mailing the coupon below.

There is a difference in polyethylenes—

specify ALATHON®

polyethylene resin

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Please send me complete information on Du Pont "ALATHON" polyethylene resins. I am interested in evaluating these materials for

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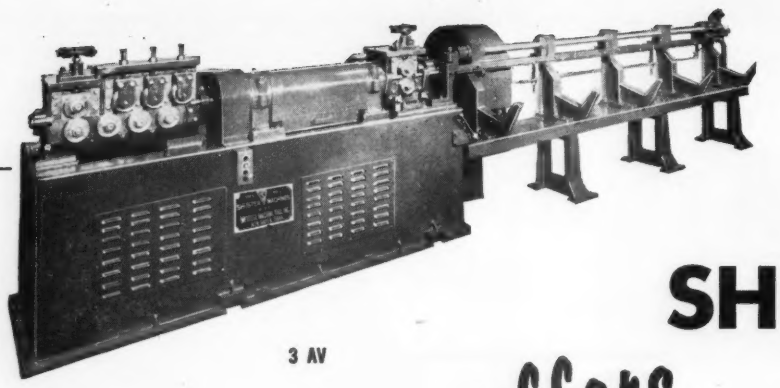

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90th year

SHUSTER offers most!!

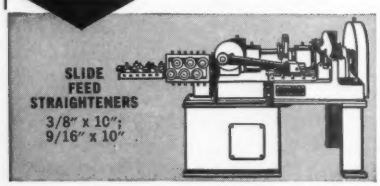
In Wire Straightening and Cutting, SHUSTER variable speed machines consistently provide the newest tested principles of operation – SHUSTER'S 90 years' know-how will cut your wire straightening and cutting costs every day!

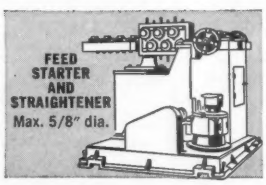
	SHUSTER	Manufacturer B	Manufacturer C	Manufacturer D
Infinite variable speed of all feed and cutoff ranges	YES	NO	NO	NO
Electrically controlled Target and Clutch	YES	Some Models	NO	NO
Power Consumption	LOW	HIGH	MEDIUM	HIGH
Complete On-The-Job Engineering service	YES	NO	NO	NO
Flat and Shape Stock Machines available	YES	YES	NO	NO

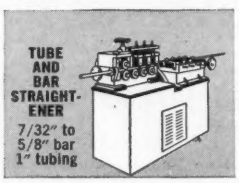
SHUSTER – the *first* name (since 1866) in Wire Straightening and Cutting, offers *more* production features, at less investment and operating cost, than have ever been available in the field!

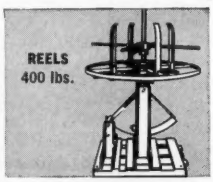
METTLER
MACHINE TOOL, INC.
155 West Adeline Street, New Haven, Conn.

This too is SHUSTER.

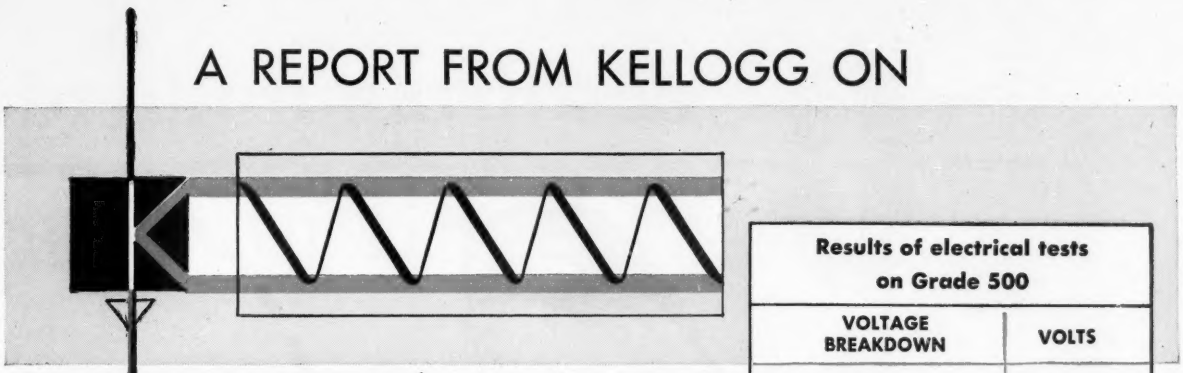








A REPORT FROM KELLOGG ON



KEL-F® Plastic GRADE 500

Results of electrical tests on Grade 500	
VOLTAGE BREAKDOWN	**VOLTS**
Initial volts	13,500
at 150°C.—1 week	13,000
2 weeks	14,600
at 175°C.—1 week	13,500
2 weeks	14,500
at 190°C.—1 week	11,300
2 weeks	9,600

New Fluorocarbon Plastic Formulation Provides Wire Insulation that can withstand Continuous Operating Temperature up to 175° C.

KEL-F PLASTIC, Grade 500—like all the molding compounds in the KEL-F fluorocarbon series—is notable for its extreme resistance to high temperatures, chemical attack, humidity and abrasion.

Of special interest to the electrical field is the higher heat-aging level of wire coatings with the new Grade 500. Tests on wire insulation indicate a continuous operating range of temperatures up to 175°C. Samples of coated wire exposed to temperatures as high as 190°C. for extended periods of time (2-3 months) still maintain relatively high voltage breakdown values.

Results of these electrical performance tests are summarized in the table above. An examination of the breakdown voltages after continuous exposure to high temperatures points up the high heat-aging level reached by KEL-F PLASTIC Grade 500 coated wire.

TWO TYPES AVAILABLE

KEL-F PLASTIC GRADE 500 is produced in two distinct types:

GRADE 500-F, a less crystalline type that resists embrittlement by high temperatures. Recommended for general wire and cable insulation, hook-up wire, thin wall tubing, and spaghetti.

GRADE 500-R, possesses same general properties as F type, only a slightly more rigid formulation. Recommended for use in connector insulation and for coil forms.

MOLDABILITY

The new Grade 500 permits extrusion of high molecular weight coatings and thin wall tubing that resist embrittlement when exposed to higher temperatures. Less crystalline in structure, Grade 500 can be fabricated without danger of splitting or crazing when heated. The flexibility of Grade 500 coated wire is also slightly improved.

TECHNICAL SERVICE

KEL-F PLASTIC Grade 500 is a result of Kellogg's comprehensive research in the field of fluorocarbon chemistry. Our technical staff will be happy to work with you in developing specific applications for the new Grade 500.

REPORT ON KEL-F PLASTIC, GRADE 500

Kellogg's TECHNICAL CUSTOMER Service Staff has prepared a technical report on KEL-F PLASTIC, Grade 500. It contains information on properties, extrusion techniques and operating conditions, electrical tests, and field evaluation of the new 500 Grade. To get your copy, just clip and mail coupon below.

® KEL-F is a registered trademark of The M. W. Kellogg Co. for its fluorocarbon products.

THE M. W. KELLOGG COMPANY
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Please send me a copy of your First Report on KEL-F PLASTIC—Grade 500.

Name_____

Firm_____ Position_____

Address_____

City_____ Zone____ State_____

broken sardines and cut fingers

You avoid broken sardines and cut fingers when you open stubborn cans with their handy keys—keys which are often made from special uniformly tempered, low carbon CF&I-Wickwire Can Key Wire.

Chances are you don't need wire to make can keys. But *you may need one or more of the nearly 100 different categories of specialty wire for which CF&I-Wickwire is famous.* Let us show you how we can meet your most rigid chemical and physical specifications on high and low carbon wire in all sizes, shapes, tempers, finishes and grades.

Check This List!

FOR THE WIRE YOU REQUIRE, SEE CF&I-WICKWIRE.

FLAT AND SHAPED WIRES
Armor Wire
Bobby Pin Wire
Bookbinder Wire
Brush Wire
Casing Wire
Cotter Pin Wire
Curtain Spring Wire
Die Spring Wire
Gutter Broom Wire
Lock Spring Steel
Rake Tine Steel
Regulator Spring Wire
Snake Fishing Steel
Stapling Wire for Preformed Staples (Flat)

LOW CARBON FINE AND SPECIALTY WIRE
Bee Wire
Bonnet Wire
Bookbinder Wire
Broom Wire
Clip Wire
Dent Spacer Wire
Drapery Pin Wire
Florist Wire
Fuse Wire
Glass Netting Wire
Hairpin Wire
Hook and Eye Wire
Mattress Wire
Picture Cord Wire
Picker Tooth Wire
Pin Ticket Wire
Pin Wire
Ring Traveller Wire
Spiral Binding Wire
Stapling Wire
Stapling Wire for Preformed Staples
Stone Wire
Weaving Wire
Weaving Wire for Fly Screen Cloth
Wissco Iron Wire

HIGH CARBON FINE AND SPECIALTY WIRE
Aircraft Cord Wire
Armor Wire
Belt Hook Wire
Bobbin Ring Wire
Brush Wire (Tempered and Untempered)
Brush Wire (High Strain)
Chrome Vanadium Spring Wire
Core Wire (Aluminum Cable Steel Reinforced)
Curtain Spring Wire
Flexible Shaft Wire
"Gamma" Spring Wire (Upholstery Spring Wire)
Zig Zag Wire
No-Sag Wire
Hat Wire
Heddle Wire
Hose Reinforcement Wire
Hose Wire, Mechanical
Hose Wire, Vacuum and Defroster
Rope Wire
Signal Corps Wire
Spoke Wire
Hard Drawn Spring Wire
Oil Tempered Wire
Spheroidized or Annealed Spring Wire
Tire Bead Wire
Valve Spring Wire

MANUFACTURERS LOW CARBON COARSE WIRE
Bag Tie Wire
Basket Handle Wire
Box Binding Wire
Brush Handle Wire
"Cal-Tie" Wire
Can Key Wire
Case Hardened Ball Wire
Chain Wire
Clamp Wire
Clothes Pin Wire
Concrete Wall Reinforcement Wire
Garment Hanger Wire
Hay Baling Wire (Coiled)
Lingo Wire
Lintel Wire
Loop Wire
Merchant Quality Wire
Pail Bail Wire
Rivet Wire
Stapling Wire
Strand Wire
Tying Wire
Welding Wire
Wissco Iron Wire
Industrial Quality Wire
Cold Rolling Quality Wire
Heading, Forging or Roll Threading Quality Wire
Medium High Carbon Wire

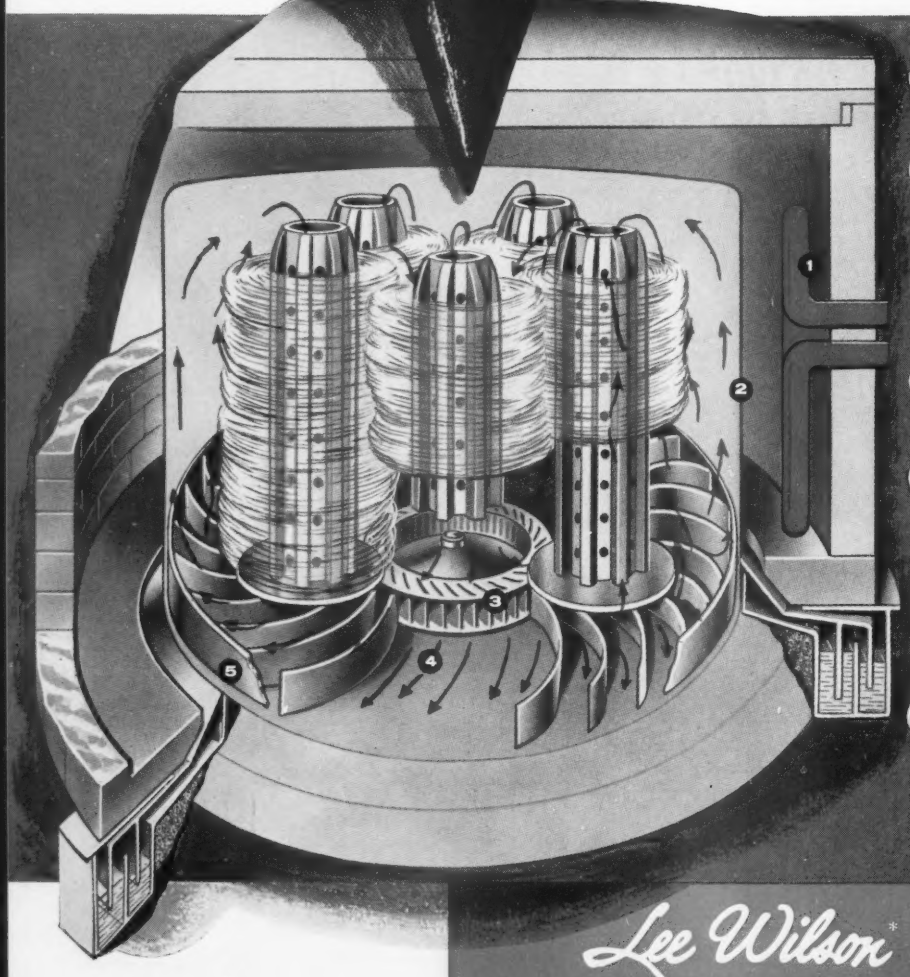
CF&I-WICKWIRE WIRE
THE COLORADO FUEL AND IRON CORPORATION

THE COLORADO FUEL AND IRON CORPORATION—Albuquerque • Amarillo • Billings • Boise • Butte • Casper Denver • El Paso • Ft. Worth • Houston • Kansas City • Lincoln (Neb.) • Oklahoma City • Phoenix Pueblo • Salt Lake City • Wichita • PACIFIC COAST DIVISION—Los Angeles • Oakland • Portland San Francisco • Seattle • Spokane • WICKWIRE SPENCER STEEL DIVISION—Atlanta • Boston • Buffalo Chicago • Detroit • New Orleans • New York • Philadelphia • CF&I OFFICES IN CANADA: Toronto • Montreal
CANADIAN REPRESENTATIVES AT: Calgary • Edmonton • Vancouver • Winnipeg

4241

WHAT IS High convection Wire Annealing?

• It is a system developed by Lee Wilson to get the greatest annealing yield out of the smallest floor space and the highest uniformity of physical properties at the least cost. Here is how it works —



1 THE SOURCE OF HEAT

"O" type radiant tubes with inputs up to 5 million Btu. per hour.

2 CONVECTION TRANSFER

Gases are circulated from the fan at velocities over 3000 ft. per minute over the inner cover surfaces from which these gases are heated by convection transfer. This velocity is many times greater than has been available in older designs, which makes it possible to utilize the extremely high heat inputs available.

3 THE ENERGY SOURCE

7½ to 25 HP fan drives, delivering 5000 cfm. to 12,500 cfm. of gas circulation.

4 SECONDARY CIRCULATION

The velocity of the gas movement from the fan is at terrific speeds which aspirate a flow of gases down through the center of all of the stems in the charge. Performance checks indicate that the secondary gas movement amounts to as much as 50% of the primary fan capacity, which brings the inside of each stem of wire up to temperature in the same time as the outside surfaces of the coils.

5 ENERGY CONVERSION UNIT

The diffuser assembly, where the velocity pressures from the fan are converted to static pressures at twice the normal conversion efficiency of other furnaces.

Lee Wilson* ENGINEERING COMPANY, INC.

7000S WEST LAKE ROAD • CLEVELAND 14, OHIO

HIGH CONVECTION ANNEALING FURNACES
MAKE THE BEST METALS BETTER

*ORIGINATORS AND LEADING PRODUCERS OF HIGH CONVECTION ANNEALING FURNACES

MEMO TO: *You*

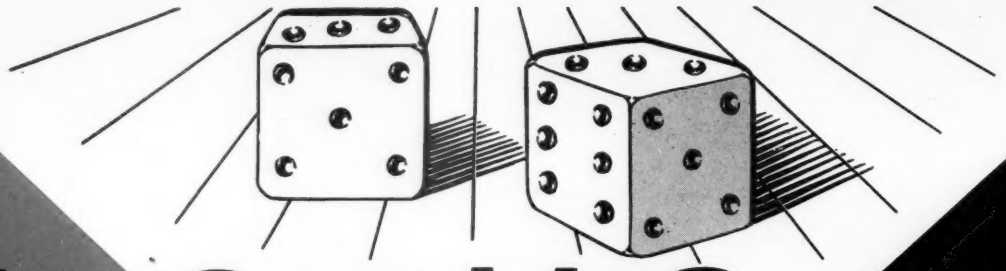
YOU MIGHT AS WELL try to count the beans in a carload as the number of parts that are made of Roebling High Carbon Specialties, Flat Wire and Spring Steel. These Roebling products are unsurpassed for mechanical and dimensional uniformity . . . for speeding manufacturers' production and cutting costs.

Next time you order cold rolled high carbon wire or spring steel specify Roebling. Strictly on its performance you'll probably become a steady customer from then on. John A. Roebling's Sons Corporation, Trenton 2, N. J.

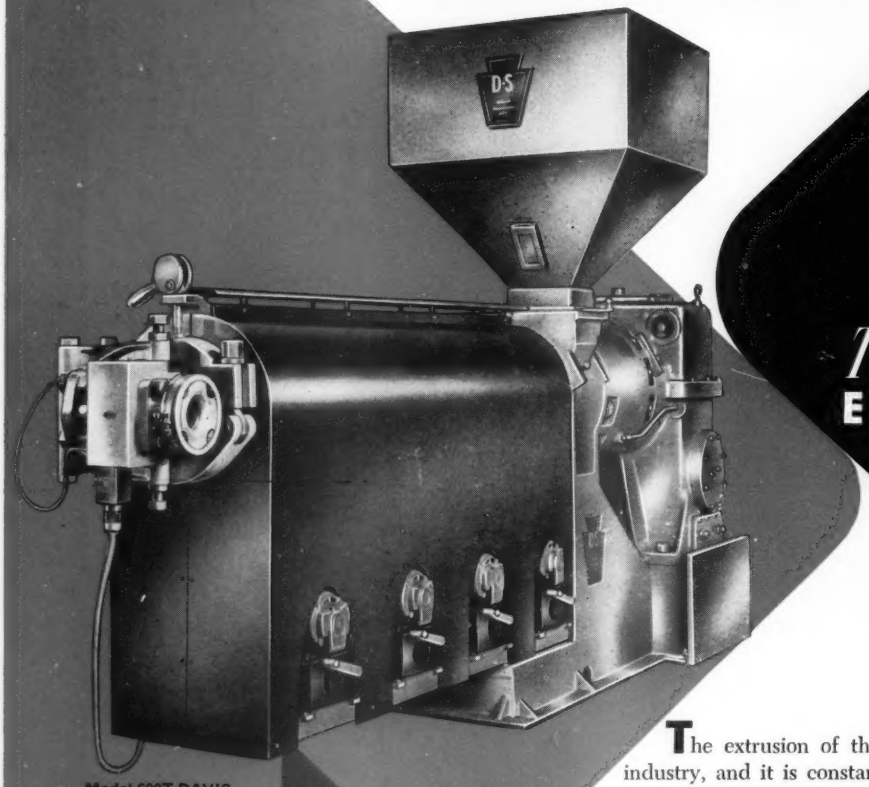
ROEBLING

Subsidiary of The Colorado Fuel and Iron Corporation

ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. & 5 PITTSBURGH ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 2340 GLENDALE-MILFORD RD., EVENDALE • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • ROCHESTER, 1 FLINT ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • ST. LOUIS, 3001 DELMAR BLVD. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, 19 RECTOR ST., NEW YORK 6, N.Y.



Why Gamble?



Model 600T DAVIS-STANDARD® *THERMA–FIN* Super Extruder Having 6" Bore. Standard and Super Models Available in 1½", 2", 2½", 3¼", 4½", and 6" Bore Sizes.

Use a D-S MYSTIC CONNECTICUT U.S.A. *THERMA-FIN* EXTRUDER*

The extrusion of thermoplastics is a relatively new industry, and it is constantly undergoing changes that require extruder manufacturers to keep on their toes or be left behind.

DAVIS-STANDARD® has always made every effort to keep abreast of the demands and requirements of the industry. Consequently, we frequently redesign or modify our equipment so that we can provide the equipment that is necessary to produce high quality products at a high rate of production.

When you use a DAVIS-STANDARD® *THERMA–FIN* Extruder you do not gamble on the quality of the final product. The exclusive D-S *THERMA–FIN* Temperature Control System, along with the many other unique design and construction features found in all D-S extruders, represent the latest developments in extruder manufacture.

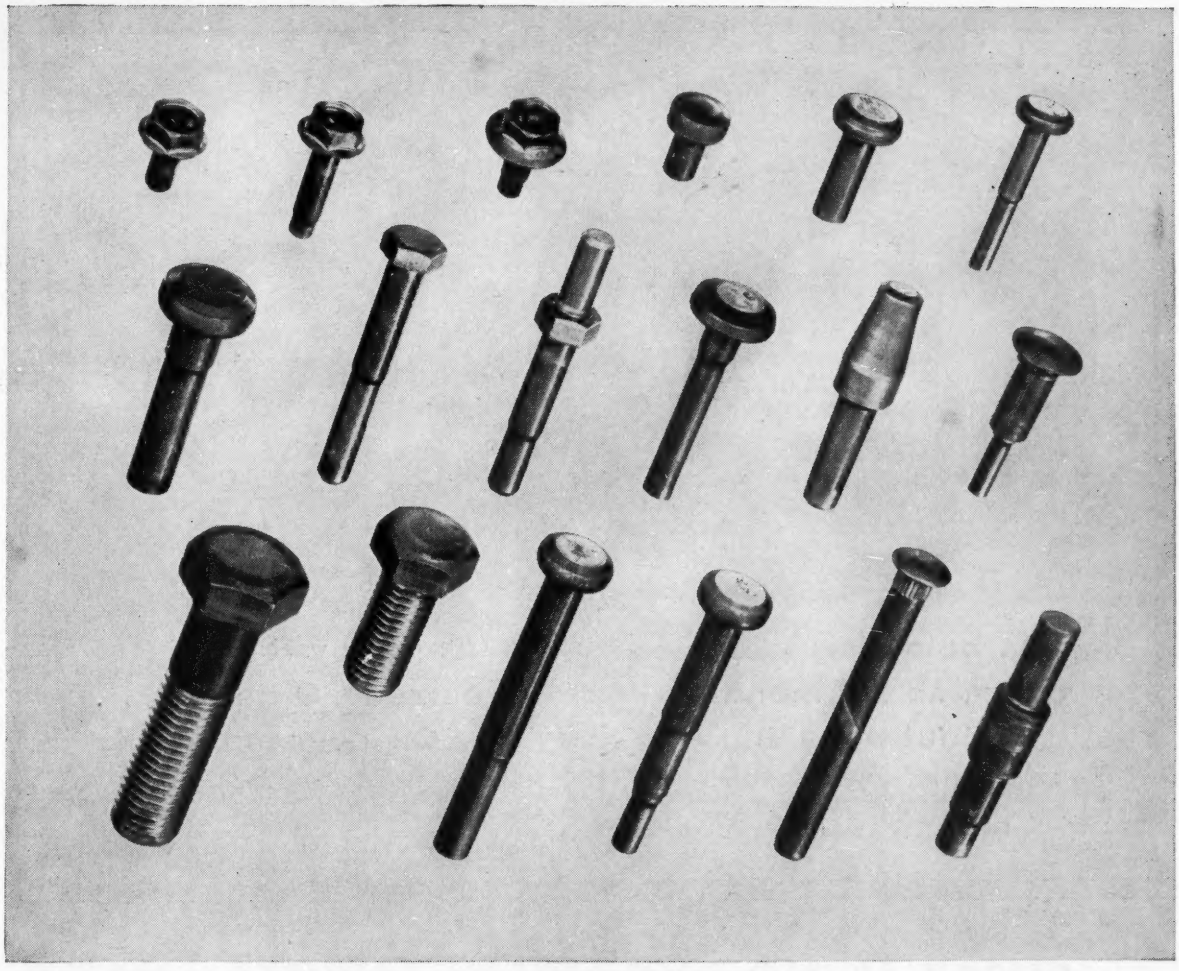
*U. S. Patents Pending

DAVIS-STANDARD SALES CORPORATION

20 WATER STREET, MYSTIC, CONNECTICUT

SOLE SELLING AGENTS FOR... THE STANDARD MACHINERY CORPORATION
World's Largest Manufacturers of Custom-Built Extruding Machines

IN EUROPE AND THE STERLING AREA, CONTACT FINNEY PRESSES LTD., BIRMINGHAM, ENGLAND



Is your part illustrated? These are representative of the shapes that can be cold formed more effectively with Granodraw.

GRANODRAW® PROCESS INCREASES TOOL LIFE 2-5 TIMES IN COLD HEADING STEEL FASTENERS

Thorough research, in cooperation with a leading manufacturer of headed fasteners, has proved the value of Granodraw phosphate coating of stock prior to cold working. Typical of the improvement in tool life and in production are the examples shown in the table.

But the advantages do not stop here in cold heading fasteners or cold working other products. This chemical treatment process permits greater speed of draw; greater reductions within the physical limits of the metal; more passes with the same number of intermediate treatments; and the possibility of fewer process anneals. It also results in less downtime of machines, better surface finish on products, cold forming of more complex shapes, fewer rejects, and a cleaner shop.

Write us for complete information about Granodraw and its application in cold forming operations.

PRODUCTION AND TOOL LIFE

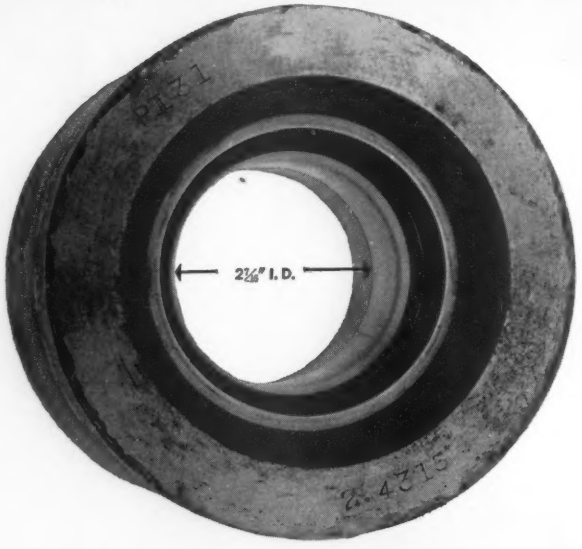
PRODUCT	MATERIAL		AV. PIECES PER DIE DRESSING	
	Tool	Stock	Granodraw-Treated	Other Treatment
⅜ x ⅞ rivet	Hardened Alloy Steel	1010 Steel	647,000	180,500
5/16 x 24 flat head shoulder bolt	Hardened Alloy Steel	1010 Steel	26,000	5000-8000
Hex Head Cap Screws	Hardened Alloy Steel	1038 Steel	53,000	13,000-14,000
¼ x 20 Hex Machine Bolt	Hardened Alloy Steel	1018 Steel	28,000	13,000

Note. Although investigations on the life of carbide tools are not completed, one item deserves mention. A 5/16 x 24 hex head shoulder bolt showed a strikingly low carbide tool life of 67,000 pieces per die. Using Granodraw-treated rod, one die produced 105,000 pieces—another 194,000 pieces. And both dies were in good condition at the end of the run.

AMERICAN CHEMICAL PAINT COMPANY, Ambler 30, Pa.

CHEMICALS ACP PROCESSES

DETROIT, MICHIGAN ST. JOSEPH, MISSOURI NILES, CALIFORNIA WINDSOR, ONTARIO



Carboloy R-16 Die operated 26 months without polishing

Over 5,000 tons of steel were drawn by this R-16 die in 26 months . . . without developing an approach wear ring. During that time, the 2.4315" hole increased only .0025"—about one-tenth of 1 percent. (R-16 die shown one-half size.)

Carboloy R-3 Die resized 20 times . . . to 30% over maximum

Before its first resize, this R-3 die had already drawn more wire than its user expected on the first size. After its 20th resize, the die was still producing high-quality wire—with a hole 30% larger than normally recommended maximum. (R-3 die shown full size.)

THERE IS NO "NORMAL" SERVICE LIFE FOR CARBOLOY WIRE DIES

There's no such limit as "normal" service life with Carboloy® Wire Dies. Time and again, mill records prove these dies deliver far more than is expected.

Outperform other carbide dies

The R-16 die, at left, drew more than 5,000 tons of solid bar stock before it required polishing . . . breaking all previous carbide drawing records at Wyckoff Steel Company.

The story of the R-3, at right, is equally impressive in terms of effective service life. When the die was finally retired, the original .025" hole had been resized 20 times. The final .236" hole was 30% larger than the maximum .182" normally recommended—yet wire quality was maintained.

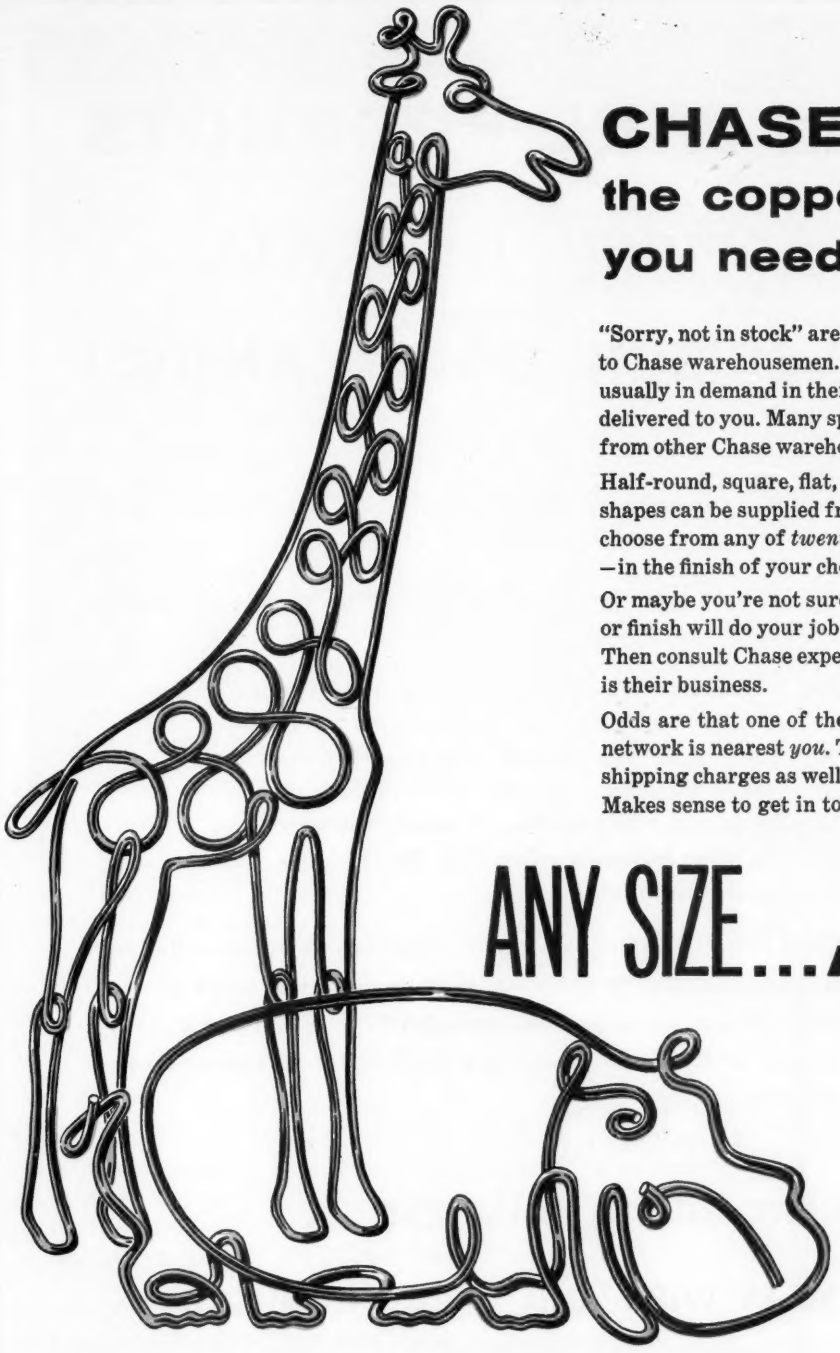
Get these "bonus" services

1. On-the-job engineering service
2. Immediate local delivery
3. Available die servicing facilities

Whether your business is drawing, flattening, extruding, or heading, there's a Carboloy product to fit your needs. For more information, or in-plant assistance, write: *Metallurgical Products Department of General Electric Company, 11171 E. 8 Mile Road, Detroit 32, Mich.*

CARBOLOY
CEMENTED CARBIDES

Carboloy is a trademark of General Electric Company



CHASE® can supply the copper alloy wire you need

"Sorry, not in stock" are almost unheard of words to Chase warehousemen. They have stocks of the alloys usually in demand in their area—ready to be quickly delivered to you. Many specials can be obtained for you from other Chase warehouses.

Half-round, square, flat, oval, as well as irregular shapes can be supplied from the Chase mills. You can choose from any of *twenty-three* different copper alloys —in the finish of your choice.

Or maybe you're not sure *which* shape or alloy or temper or finish will do your job best and at lowest cost. Then consult Chase experts. Helping you solve problems is their business.

Odds are that one of the warehouses in the huge Chase network is nearest *you*. That means savings on shipping charges as well as faster delivery. Makes sense to get in touch with Chase today!

ANY SIZE...ANY SHAPE

- ROUND
- HALF-ROUND
- SQUARE
- FLAT
- OVAL

AND OTHERS

Chase®

BRASS & COPPER CO.

WATERBURY 20, CONNECTICUT • SUBSIDIARY OF KENNECOTT COPPER CORPORATION

CALL CHASE FOR STAINLESS STEEL TOO!

NEW! Chase's informative wire and rod movie: "IN THE CHIPS." Arrange for a free loan of this film by contacting the Chase warehouse or sales office near you. Write on your company letterhead, today!

The Nation's Headquarters for Brass & Copper (†sales office only)

Atlanta	Chicago	Denver	Indianapolis	Minneapolis	Philadelphia
Baltimore	Cincinnati	Detroit	Kansas City, Mo.	Newark	Pittsburgh
Boston	Cleveland	Grand Rapids†	Los Angeles	New Orleans	Providence
Charlotte†	Dallas	Houston	Milwaukee	New York	Rochester†
	St. Louis	San Francisco	Seattle	Waterbury	

WIRE and WIRE PRODUCTS

reaches many prospects

YOUR SALESMEN DON'T KNOW!

No matter how big you are, the odds are you don't know all your actual prospective customers.

If your company is small, it is even more important to be "calling" on your prospects and customers regularly through advertising.

Your advertising in Wire and Wire Products will be seen by many people in the plants you wish to "sell" whom your salesmen never would see, yet who specify, actually buy or who influence decisions on products to be purchased. Your advertising is bound to be of immeasurable value to you, too, in paving the way for a good reception for your salesmen when they do call. And the field's buying power is tremendous!

WIRE AND WIRE PRODUCTS circulation, is all paid. We have no agents, offer no premiums or make special inducements to get circulation, except the value of the editorial contents in itself—yet our renewals have averaged 97% or better for many years. That's why it is a good and forceful advertising medium for all concerns who have products to sell to the wire industry.

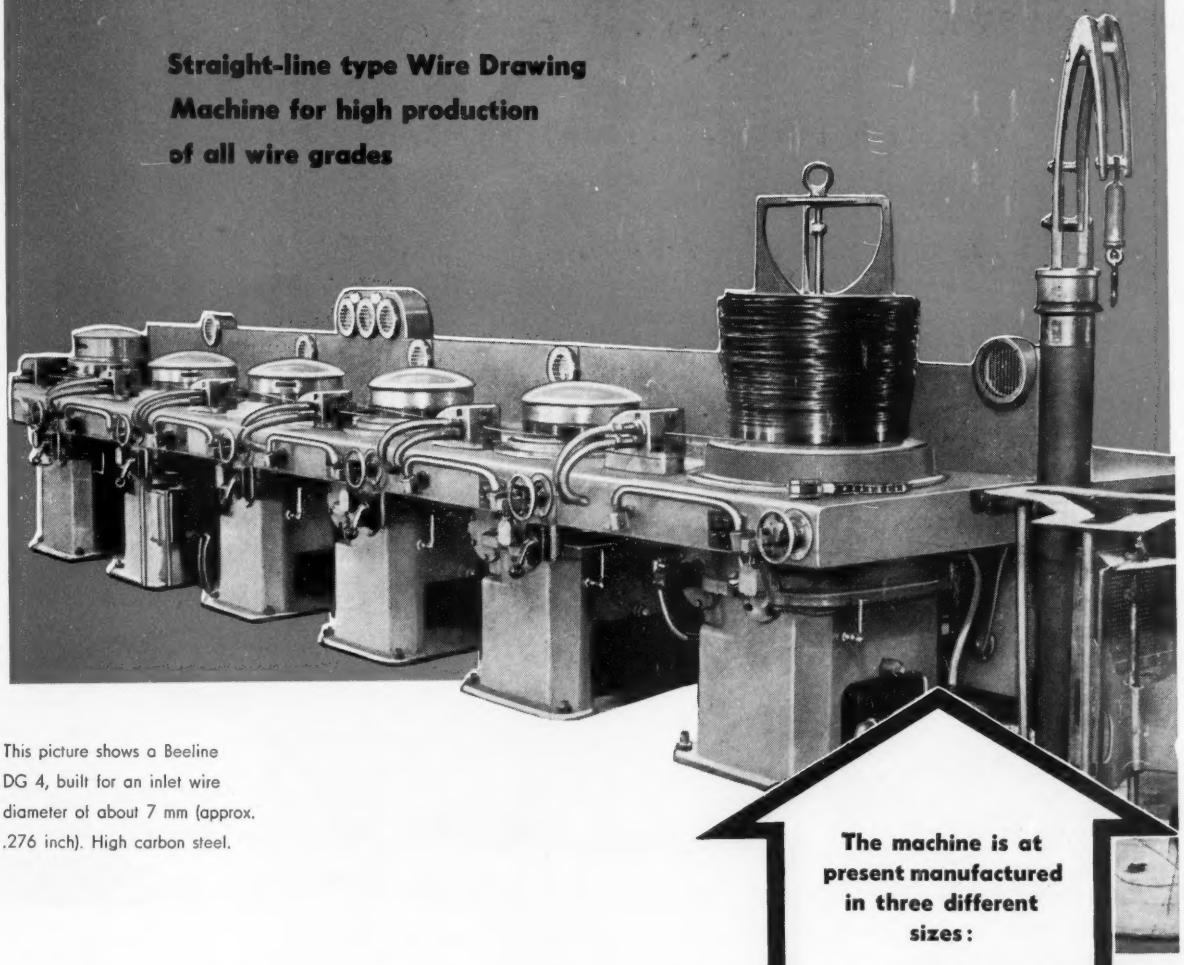
- **GET YOUR SHARE OF THE BUSINESS . . .**
- **ADVERTISE IN WIRE AND WIRE PRODUCTS . . .**
- **SEND FOR ADVERTISING RATES TODAY . . .**

WIRE and WIRE PRODUCTS

453 MAIN STREET **STAMFORD, CONN.**

THE BEELINE WIRE DRAWING MACHINE

Straight-line type Wire Drawing Machine for high production of all wire grades



This picture shows a Beeline DG 4, built for an inlet wire diameter of about 7 mm (approx. .276 inch). High carbon steel.

Prominent Beeline features:

- Complete absence of slipping between wire and block.
- Direct block-to-block wire running, with automatic speed control and no loops or other mechanical adjusting devices.
- Continuous speed adjustment from almost zero up to maximum.

Let us help you solve your problems. We shall be glad to answer your questions promptly. Don't forget to let us know what wire is to be drawn, the inlet and finished diameter, its intended use, the production required, and all other relevant information (tensile strength of the finished wire etc.). Then we can suggest a machine that is just right for you.

The machine is at present manufactured in three different sizes:

BEELINE DG 5
for heavy wire, about 13 mm. (.500 inch)

BEELINE DG 4
for wire rods, about 7 mm. (.276 inch)

BEELINE DM 3
for wire with an inlet diawire of about 3 mm. (.116 inch)

MORGÅRDSHAMMAR

MORGÅRDSHAMMARS MEK VERKSTADS AB • MORGÅRDSHAMMAR • SWEDEN

Cables: Morgårdshammar, Ludvika. Tele: 0240–71100

IDEAS...*on making the most of wire cloth!*

● Unless you're in the business up to your ears, you'd hardly be aware of the infinite variations that can be offered today in industrial wire cloth. Not only variations in the wire, metal, weave and mesh, but also in finishes, coatings, roll lengths, widths and packaging. And the *Reynolds Wire Division* of National-Standard has carried this flexibility to a high point in the industry.

So, you can see that it is mighty important for users or fabricators to probe today's possibilities carefully, and to be *sure* they are getting *the* wire cloth that produces best, performs best, minimizes waste, and costs the least for their particular production.

And that is exactly why *Reynolds Wire Division* goes all out in furnishing technical and analytical service—service that benefits customer after customer, small or large. This exceptional service is available coast to coast . . . wherever you are.

Are you open to some ideas on making the most of wire cloth? Do you have any particular production problems in the use of wire cloth? Let's discuss your requirements.

NATIONAL-STANDARD COMPANY • NILES, MICHIGAN
Tire Wire, Stainless, Fabricated Braids and Tape

ATHENIA STEEL DIVISION • CLIFTON, N. J.
Flat, High Carbon, Cold Rolled Spring Steel

REYNOLDS WIRE DIVISION • DIXON, ILLINOIS
Industrial Wire Cloth

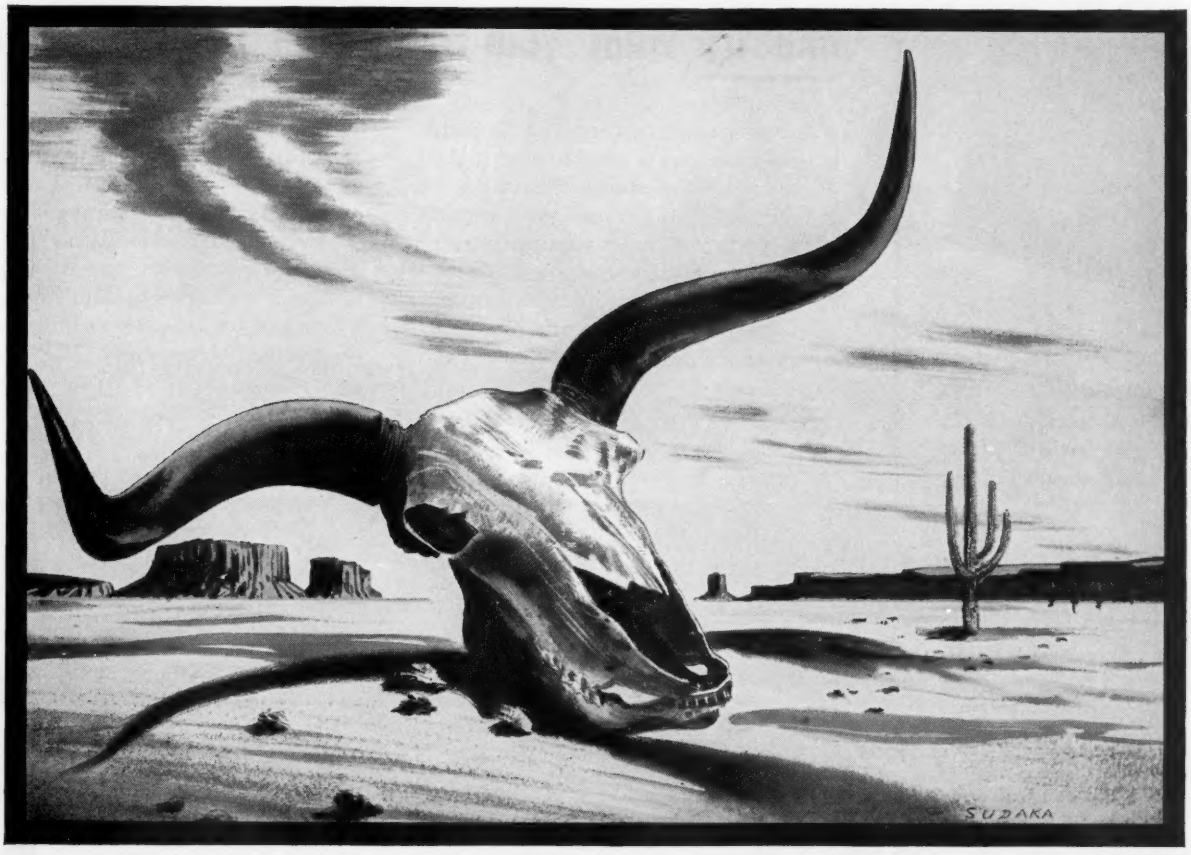
NS
NATIONAL-STANDARD Company
NILES, MICHIGAN

WAGNER LITHO MACHINERY • JERSEY CITY, N. J.
Special Machinery for Metal Decorating

WORCESTER WIRE WORKS DIVISION • WORCESTER, MASS.
Round and Shaped Steel Wire, Small Sizes

Naugatuck NAUGAPOL

specially processed R-S rubber



bone dry

...always!

A BONE parching on the desert couldn't hold much less moisture than a rubber product made of NAUGAPOL®. All 6 "hot" types (1016, 1018, 1019, 1021, 1022 and 1023) and both "cold" types (1503 and 1504) of Naugapol are *specially processed for low moisture absorption* by eliminating salt as a coagulant following polymerization. Extra straining and milling further help to produce salt-free elastomers characterized by:

- **LOW MOISTURE ABSORPTION**
- **HIGH DIELECTRIC PROPERTIES**
- **CLEANLINESS & UNIFORMITY**
- **EASE OF PROCESSING**

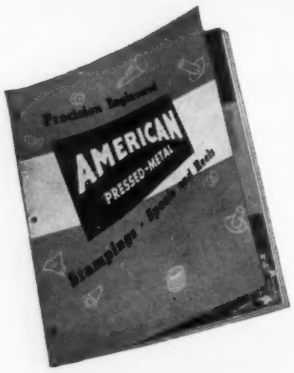
That's why NAUGAPOL butadiene-styrene polymers are so strongly preferred by manufacturers of rubber-insulated wire and cable, mechanical rubber goods and other rubber products requiring high electrical insulating qualities and excellent mechanical characteristics over a wide temperature range. Many grades of NAUGAPOL are non-discoloring, Polygard®-stabilized polymers suitable for the finest transparent, white or color-pigmented products.

Naugatuck Chemical

Division of United States Rubber Company
Naugatuck, Connecticut

IN CANADA: NAUGATUCK CHEMICALS DIVISION • Dominion Rubber Company, Limited, Elmira, Ontario • Rubber Chemicals • Synthetic Rubber • Plastics • Agricultural Chemicals • Reclaimed Rubber • Latices • Cable Address: Rubexport, N.Y.

US RUBBER



Send for your free copy of our latest bulletin on American Pressed-Metal Spools and Reels. It contains full details and charts on the many standard types.

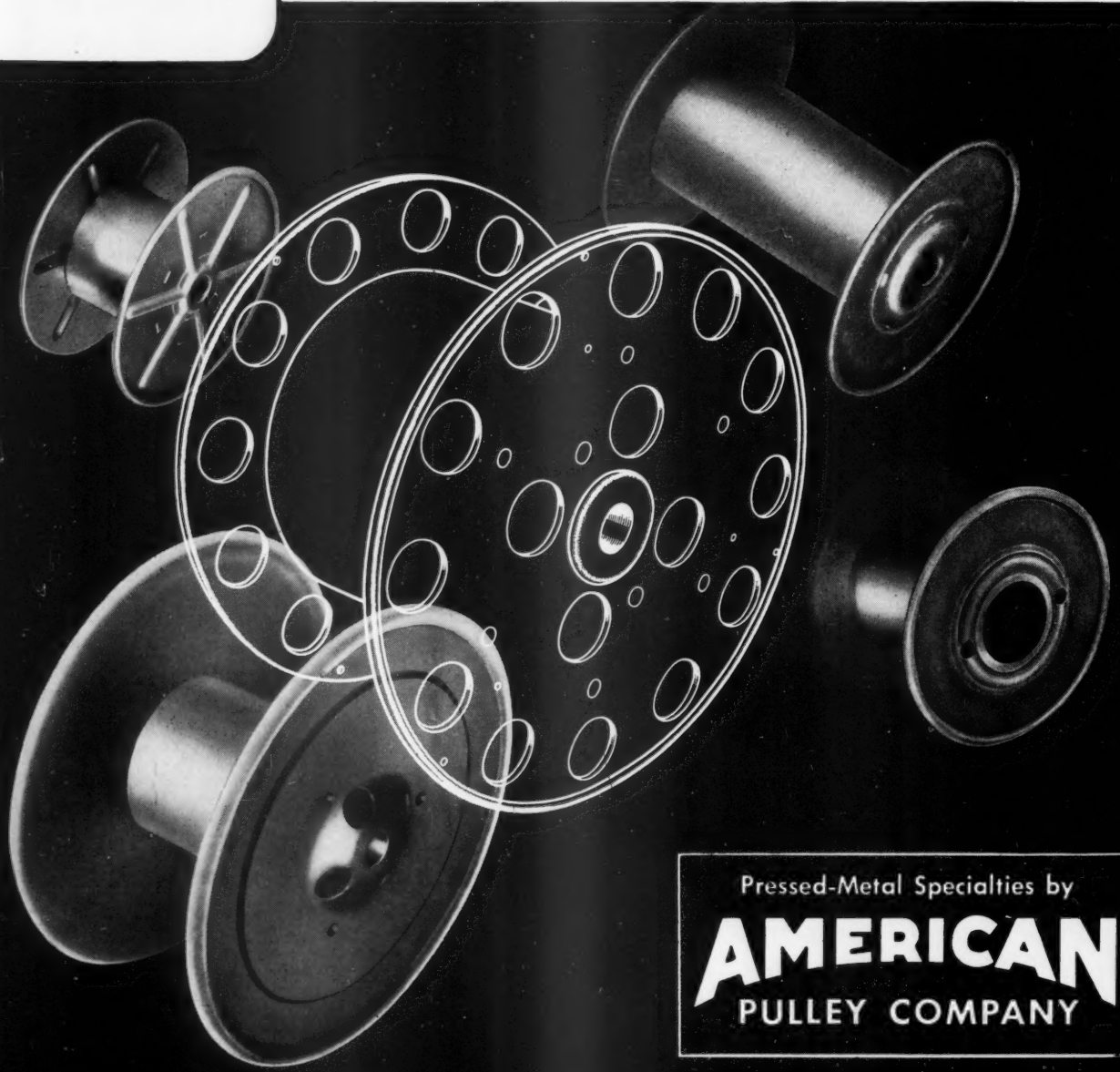
For shipping or processing spools and reels get exactly what you want from American Pulley

Name your need . . . there's an American pressed-metal reel or spool to meet it. And if our long list of standard sizes doesn't contain the model you need, we'll custom-build one to your exact requirements.

American pressed-metal spools and reels are practically indestructible—won't crack, chip or warp. They offer the added advantages of light weight, cleanliness and strength.

Almost 60 years' experience in design and manufacture—plus a vast assortment of tools, dies and other facilities for making all types of spools and reels to strict custom specifications—are at your service.

Send us your specifications, blueprints or merely tell us what you need and we'll design from scratch. You'll find our quotations fast, realistic and offering you good value for the money. The American Pulley Company, 4242 Wissahickon Ave., Philadelphia 29, Pa.



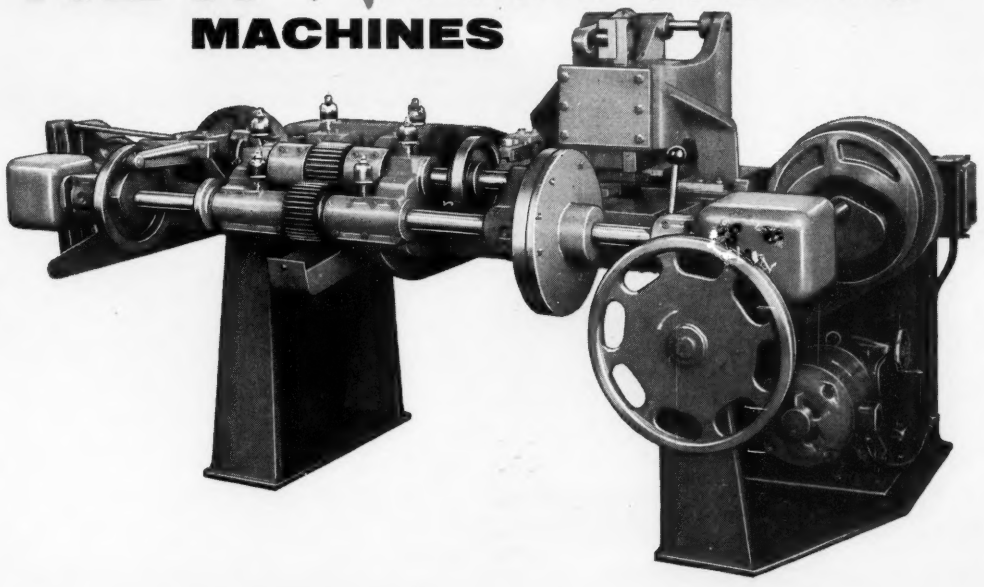
Pressed-Metal Specialties by

AMERICAN

PULLEY COMPANY

...ask **BAIRD** about it

NEW *Ribbon Metal* MACHINES



Open UNEXPLORED opportunities for cost reduction in manufacture of a wide range of parts.

- HIGH SPEED
- UNIFORM PRODUCT
- LOW TOOLING COST
- EASY MAINTENANCE
- SIMPLE OPERATION
- UNLIMITED RANGE

If you are producing small . . . or even quite large . . . formed parts out of ribbon wire or metal strip up to about 2″ wide, it will most certainly pay you to "ask Baird about it." More and more quality and cost-conscious manufacturers are finding that our NEW model Automatic High Speed Ribbon Metal Forming Machines are the ideal "production line" for such products.

Behind these machines are years of successful application to a range of work "limited only by the ingenuity of the men who design the tooling." NEW models include a host of important improvements and additional features which greatly extend the range of work and tooling possibilities. For example, what is essentially a substantial press is built right into the machine and is capable of maintaining precision in high-speed production. Baird's unique two-to-one feeding mechanism and EASY cam motions, combined with the fact that 3/4 of the cycle is available for forming rather than the usual 1/2-cycle, permits far greater latitude in combining operations and complexity of possible forms.

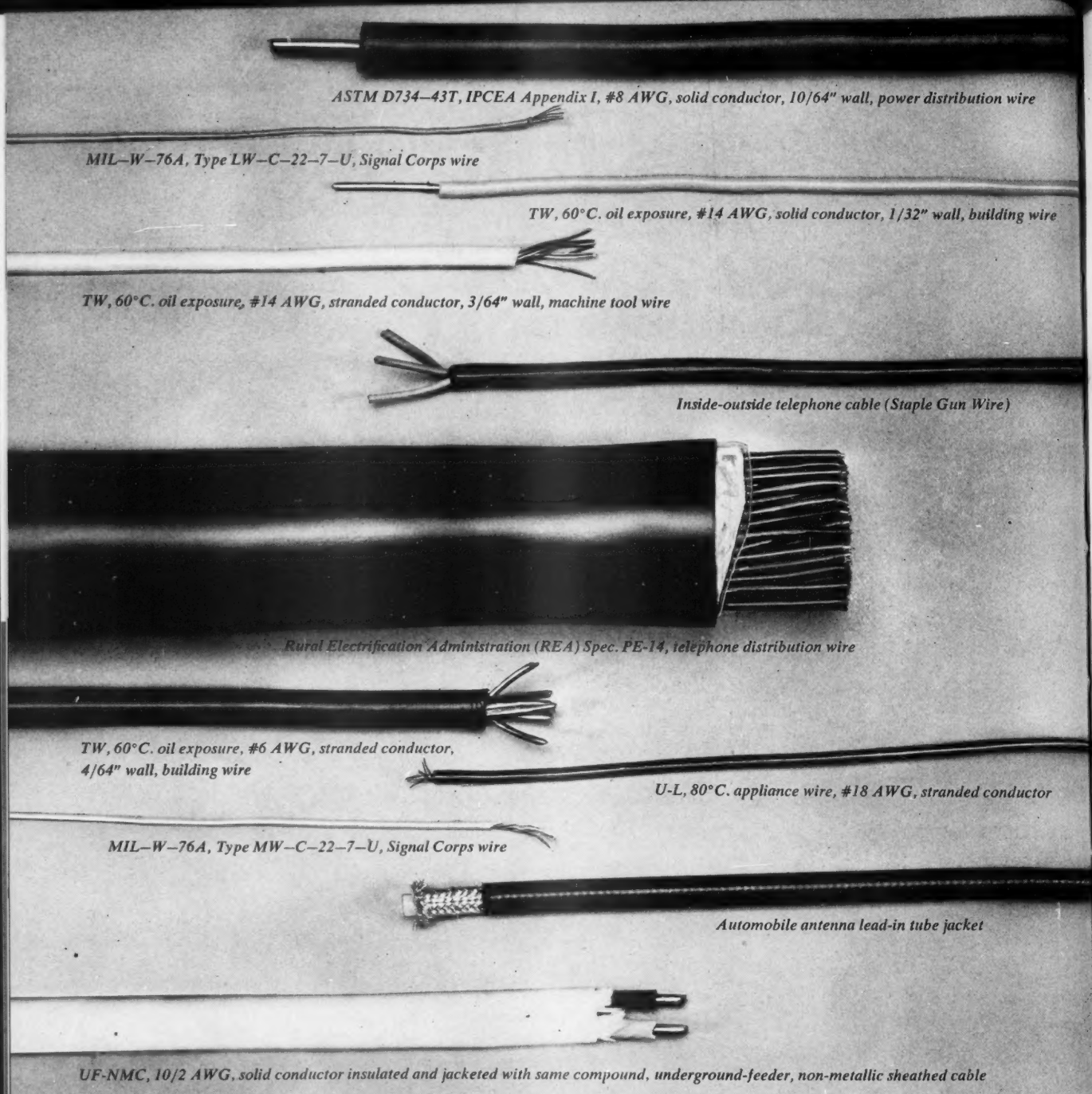
Our Engineering Department will be glad to give you further detailed information or to submit recommendations on parts or prints of your product. Write Dept. WP.

Interested in Deferred Payment? . . . "ask Baird about it."

AUTOMATIC MACHINE TOOLS • AUTOMATIC WIRE & RIBBON METAL FORMING MACHINES • AUTOMATIC PRESSES • TUMBLING BARRELS

THE BAIRD MACHINE COMPANY
STRATFORD CONNECTICUT

7BA56



ASTM D734–43T, IPCEA Appendix I, #8 AWG, solid conductor, 10/64" wall, power distribution wire

MIL–W–76A, Type LW–C–22–7–U, Signal Corps wire

TW, 60°C. oil exposure, #14 AWG, solid conductor, 1/32" wall, building wire

TW, 60°C. oil exposure, #14 AWG, stranded conductor, 3/64" wall, machine tool wire

Inside-outside telephone cable (Staple Gun Wire)

Rural Electrification Administration (REA) Spec. PE-14, telephone distribution wire

TW, 60°C. oil exposure, #6 AWG, stranded conductor, 4/64" wall, building wire

U-L, 80°C. appliance wire, #18 AWG, stranded conductor

MIL–W–76A, Type MW–C–22–7–U, Signal Corps wire

Automobile antenna lead-in tube jacket

UF-NMC, 10/2 AWG, solid conductor insulated and jacketed with same compound, underground-feeder, non-metallic sheathed cable

One vinyl compound for all–versatile OPALON* 1038

Remarkable physical and electrical properties qualify OPALON 1038 for scores of uses

A single insulating and jacketing compound now gives outstanding performance on a wider range of wire and cable applications than has ever been practical before. It is available to you *without* a premium price!

A unique combination of high insulating efficiency, excellent heat resistance and extreme toughness is responsible for the all-purpose versatility of Monsanto Opalon 1038 vinyl compound.

Opalon 1038 is widely used for U-L Type T, TW and exposure to oil at 60° C., as well as for U-L 80° C. appliance wire.

To simplify inventory and stock control, the same compound is recommended for both primary insulation and jacket in UF-NMC, underground feeder and non-metallic sheathed cable. It is especially good for machine tool wiring.

Rugged physical properties, including weather resistance and flame resistance, also qualify Opalon 1038 for insulating large-sized building wire (#6 AWG and over) and for cable jacketing.

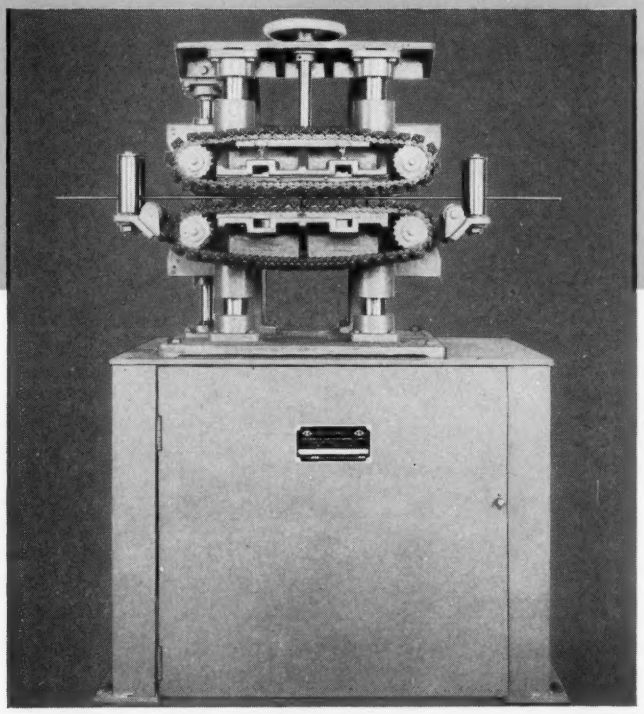
All these applications have won appropriate recognitions from U-L, IPCEA, REA and Government agencies. For data sheets and complete information, write Monsanto Chemical Company, Plastics Division, Room 1126, Springfield 2, Mass.

MONSANTO

*OPALON: REG. U. S. PAT. OFF.

ELIMINATE CAPSTANS...

Cut Cable Damage to a Minimum



ENTWISTLE CATERPULLER

PULLS CABLE STRAIGHT WITHOUT BENDING OR DAMAGING WIRE SURFACE

The most improved method of pulling cable through extruders, cablers and strander machines is with an Entwistle Caterpuller. The compact size, low maintenance costs and damage-free tendency of the Entwistle unit makes the Capstan method of pulling cable obsolete. Exacting horizontal pull is applied to the wire as it passes between the two belts of rubber gripping treads. Caterpullers are available in three sizes. Each Caterpuller is designed and built to individual specifications and pulling requirements. A minimum amount of floor space is needed for installation. Maintenance costs are very small compared to other pulling units.

Investigate how you can step up your plant production, reduce cable damage and cut maintenance costs. Write today for details.

CLASS B TYPE B
Vertical Caterpuller

Traction Length	20 inches
Maximum Cable Size	3 inches
Minimum Cable Size	3/16 inch
Pulling Force	700 lbs.*

CLASS C TYPE C
Vertical Caterpuller

Traction Length	40 inches
Maximum Cable Size	6 inches
Minimum Cable Size	3/16 inch
Pulling Force	6600 lbs.*

CLASS C TYPE CHA
Horizontal Caterpuller

Traction Length	40 inches
Maximum Cable Size	6 inches
Minimum Cable Size	3/16 inch
Pulling Force	6600 lbs.*

**Will vary with speeds and type of drive.*

ENTWISTLE MANUFACTURING CORPORATION

Plant and Executive Offices

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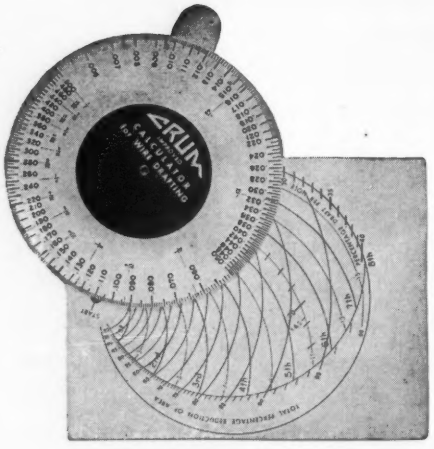
SAVE SET-UP TIME WITH THE . . .

CRUM CALCULATOR

FOR WIRE DRAFTING

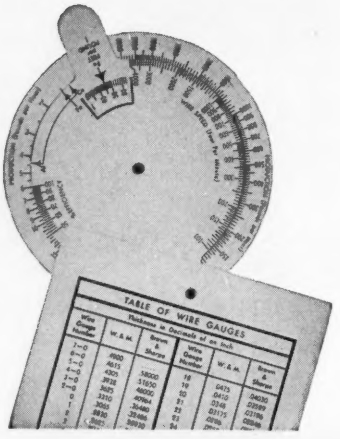
Useful and Accurate!



Front view of Crum Calculator.

THIS NEW DOUBLE-PURPOSE CALCULATOR WILL:

1. Provide quicker and more accurate information on die sizes and reduction areas;
2. Calculate wire production rates for various speeds and efficiencies.



Reverse view of Crum Calculator.

SOME OTHER FEATURES OF THE CALCULATOR

- Has new scale for more accurate determination of small percentages.
- Gives readings in B & S gauges.
- Intermediate lines provide reductions for 16 holes in one setting.
- New rectangular shaped back for better protection of calculator.
- More legible % draft-per-hole scale.
- Vinyl plastic construction, resistant to wear, warping, dirt, perspiration, wire drawing soaps—can be cleaned.
- Still fits your vest pocket.
- Handy tables of W & M and B & S gauges.
- Feet per pound calculating scale for steel, copper and aluminum wires.
- Durable, accurate, easy to use.

The improved Crum Calculator is worth its weight in gold in time saving —no laborious mathematical calculations necessary when you use it. Instruction sheet with examples accompany each Calculator. You should have one or more in your wire drawing department.

THE PRICE: $5.00 EACH

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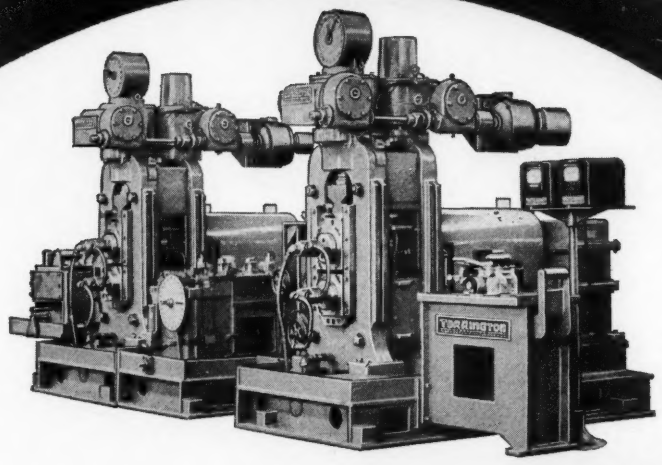
453 MAIN STREET **STAMFORD, CONN.**

(Exclusive distributors)

YOU CAN LOWER WIRE ROLLING COSTS



...with a Torrington Flat Wire Mill

SPEEDED PRODUCTION — Torrington Flat Wire Mills achieve finishing speeds up to 3500 FPM.

GREATER ACCURACY — Processed wire can be held to tolerances of .00025" in thickness and .0005" in width. Automatic magnetic gauges eliminate waste.

FLEXIBILITY — Combination of two or three flattening stands, with edgers, can accommodate wide variety of work.

DEPENDABILITY — Torrington machines are ruggedly built for years of repair-free service. Easy access to flattening rolls and other major components greatly reduces downtime for maintenance, adjustment and threading.

COMPLETE ENGINEERING SERVICE — Auxiliary mill machinery should be selected only after thorough consultation with experienced engineers. Torrington's engineering staff, backed by the knowledge and skill gained while serving the metal mills for nearly 70 years, will work with you to provide machinery best fitted to your needs. For full information, call or write: Mill Machinery Division, Torrington Manufacturing Company, Torrington, Conn.

THE
TORRINGTON
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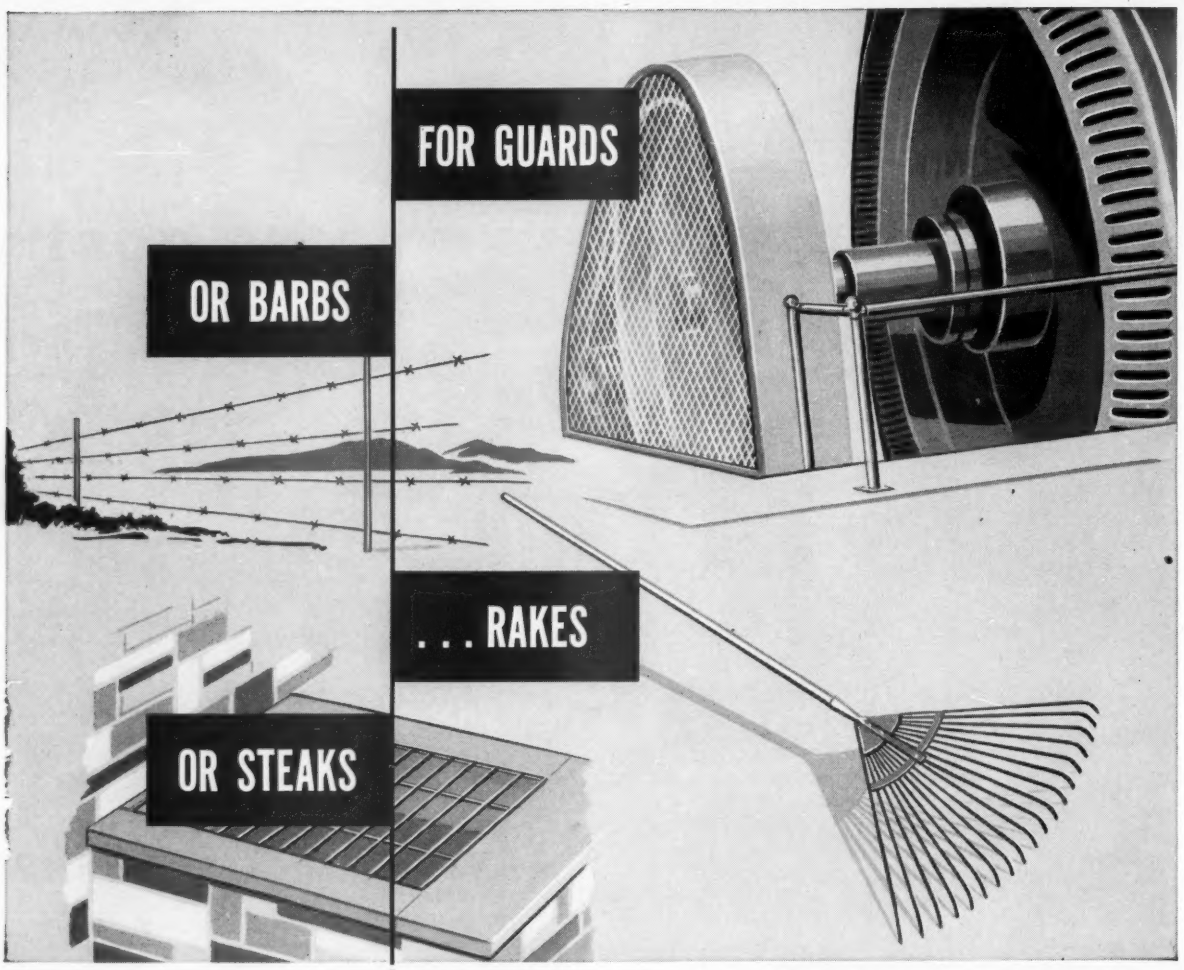

PROMPT COURTEOUS SERVICE on these and other versatile Soaps:

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FLEXAL W. D. POWDER. Scientifically designed for cold drawing phosphate coated stock.

#559 POWDER. For wet drawing of fine wire products. Will remain fluid and completely free flowing in solution at room temperature.

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SWIFT'S SOAPS

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Wherever the demand for increased production of smoother, brighter wire drawn products exists you'll find Swift's soaps helping to make the *most* of speed and the *least* of heat and stress. A versatile line of efficient, dependable drawing lubricants such as those listed at left are available for immediate delivery from strategically located Swift & Company distribution points throughout the U.S. and Canada. With them, you need never compromise the efficiency you have invested in high-speed drawing equipment.

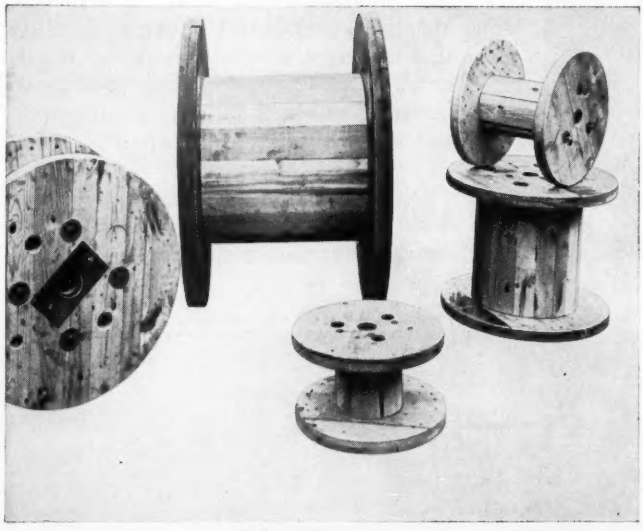
Write for details on a trial order today . . . see for *yourself* how a truly efficient drawing soap can help extend die life *and* help increase production. Remember too that—

ONE TRIAL IS BETTER THAN A THOUSAND CLAIMS

SWIFT & COMPANY, Soap Department, Chicago 9, Illinois

SAVE with..
NON-RETURNABLE
WOOD shipping REELS...

for all sizes and types of Electric Wire and Cable



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Let us quote on your reel needs. Send your specifications. Better yet, visit our plant and see how and why our reels are made so well at so low a cost.

WOOD REELS"

Youngstown "cold heading quality" wire and rods

. . . provide high fastener production at National Screw & Manufacturing Co.

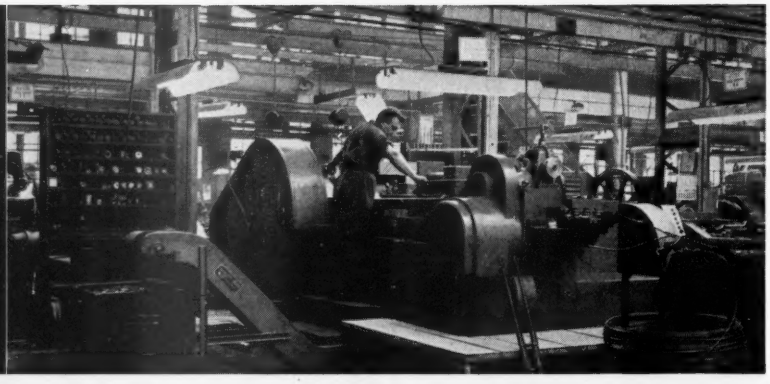
CLEVELAND'S National Screw & Manufacturing Company is widely known for the quality and dependability of their complete line of fasteners. To maintain continuous product quality and provide high production, they rely on Youngstown Cold Heading Quality Wire and Rods as the basic material for many of their fabrication processes.

Youngstown Wire & Rods are internally sound, uniform in both physical structure and chemical composition—as well as free from injurious seams and slivers. That's because they are quality controlled through all Youngstown's integrated operations from ore mining to finish product.

Furthermore, Youngstown's Cold Heading Quality Wire is supplied with a tight "Nogald" or "Extrudo" coating that provides the necessary lubrication to prevent galling and undesirable die wear. It feeds smoothly through cold headers giving steady high production right around the clock. No wonder satisfied users report: "Our production's increasing—Rejects falling—Profits up." Why not make it **your** specification?

Call or write your nearest Youngstown District Sales Office for additional information on metallurgical assistance.

THIS MODERN SOLID DIE DOUBLE LONG-STROKE COLD HEADING MACHINE AT NATIONAL SCREW PRODUCES HIGH CARBON HEX-HEAD CAP SCREWS UP TO ½ INCH DIAMETER, BY 6 INCHES LONG WITH ONLY TWO STROKES OF ITS HAMMER. USING 2800 POUNDS OF WIRE, IT DELIVERS APPROXIMATELY 4900 PIECES PER HOUR.



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THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel

General Offices - Youngstown 1, Ohio

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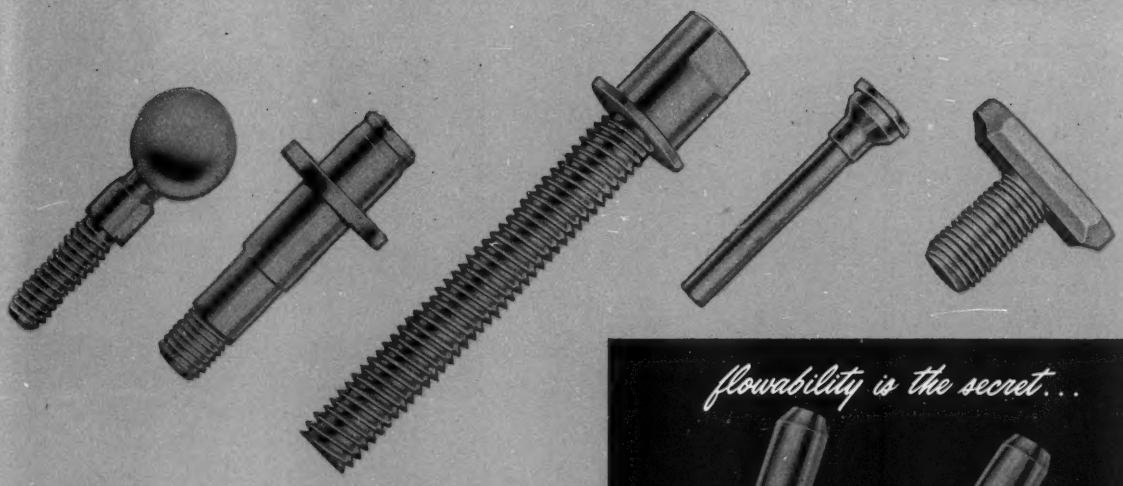


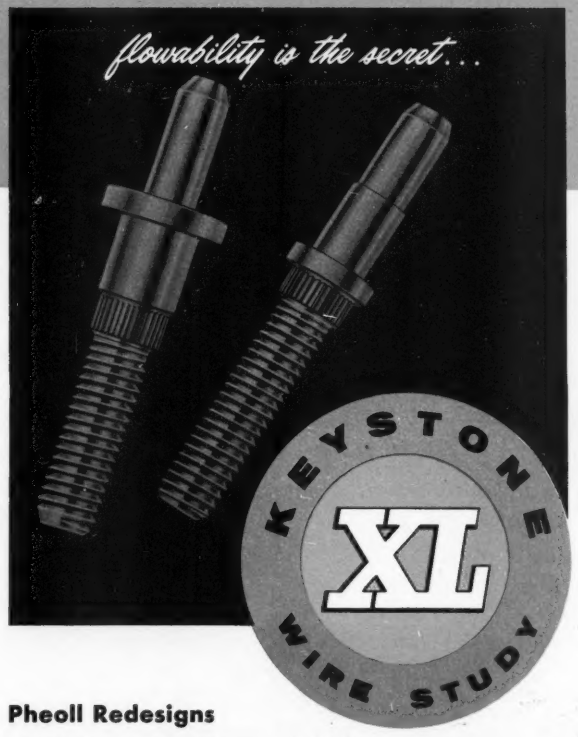
Pheoll MANUFACTURING CO. *saves customers dollars by cold heading parts.*

A recognized leader in the cold heading process field, Pheoll Manufacturing Company, Chicago, Illinois, is constantly striving to simplify and standardize fasteners for their customers. Working closely with Keystone Steel & Wire Company, Pheoll Fastener Redesign Department has developed cold heading processes that in many instances have saved 20% to 50% in time and money over other methods of manufacture.

This is another example of how alert manufacturers, like Pheoll, are cutting costs, eliminating rejects and increasing die life with Keystone "XL" Cold Heading Wire. Your Keystone Wire Specialist will show you how the *flowability* characteristics, uniform high quality and economy of Keystone "XL" Wire can help you, too. Talk over your problems with him.

Keystone Steel & Wire Company, Peoria 7, Illinois

KEYSTONE
WIRE FOR INDUSTRY



Pheoll Redesigns
Stud, Uses Keystone "XL"
to Cut Manufacturing Costs 50%

The heavy stud on the left was designed and manufactured from "XL" Cold Heading Wire by Pheoll to take the place of an equivalent part produced by other methods of manufacture. Savings to the customer amounted to 35%. The lighter stud is a further Pheoll design improvement on the same part that accomplished a savings of 50% over the original manufacturing process.

KEYSTONE STEEL & WIRE COMPANY
Peoria 7, Illinois

Mail coupon for free booklet—
COLD HEADING FACTS! Discusses methods, technical facts, wire requirements and other data.

Name_____ Title_____

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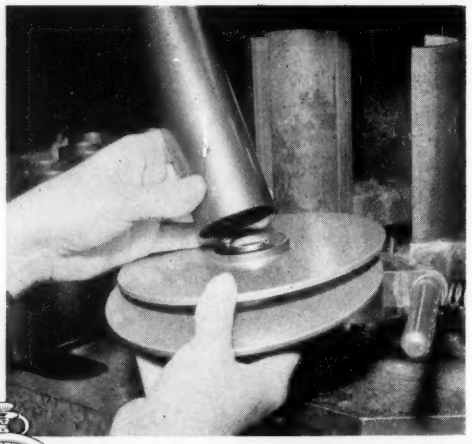
Clark Spools Assembled 400 per hour!

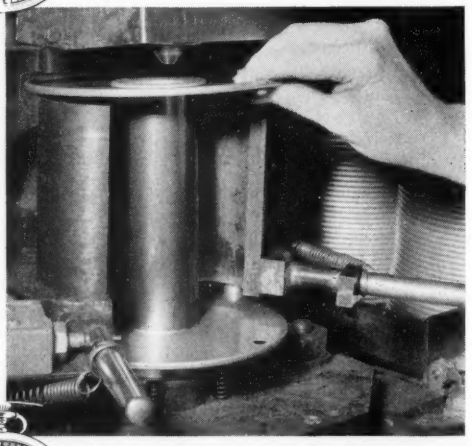
J. L. Clark custom-styled spools are engineered for quick, easy, and secure assembly at production speeds up to 400 per hour. As illustrated, the simple assembly process is accomplished with ease by a hand arbor, kick or power press operation. Continuous bond construction, specially developed by J. L. Clark, positively eliminates independent turning of end, cap or center . . . insures secure assemblies in a variety of sizes for insulated wire, automotive cable, radio and television wire, and wire solder.

These and other outstanding J. L. Clark wire spool features are part of an integrated service that includes creative design, lithographic decoration, and special fabrication. Find out today how Clark's experienced staff of specialists can work with you in developing and designing colorful, sales-winning spools. Your inquiry will receive prompt and individual attention from a Clark sales representative. *J. L. Clark Manufacturing Co., Home Office and Plant, Rockford, Illinois; Liberty Division Plant and Sales, Lancaster, Pennsylvania; New York Sales Office, Chrysler Building, New York 17, New York.*

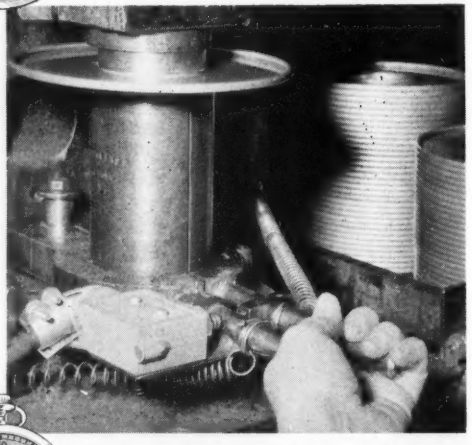
J. L. CLARK
Lithographed Metal Containers



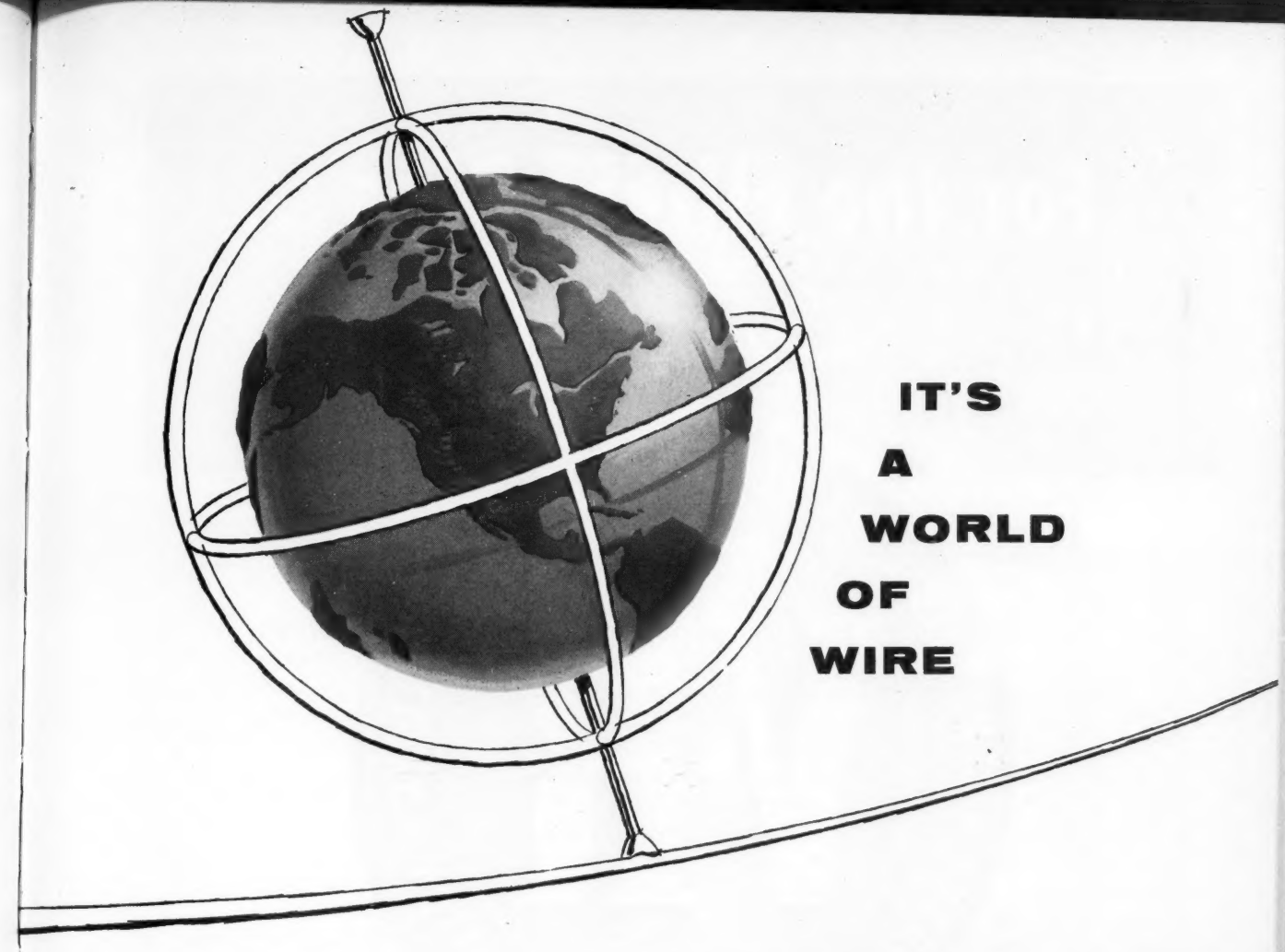
Operator picks up head . . . places arbor opening in stub of assembling die.
(TIME: 3 SECONDS)



Center is placed on head; other head is placed on center.
(TIME: 3 SECONDS)



Jaws of assembling die are closed, press is tripped (or kicked), spool is completely assembled. (TIME: 2½ SECONDS. TOTAL ASSEMBLY TIME: 8½ SECONDS)



IT'S A WORLD OF WIRE

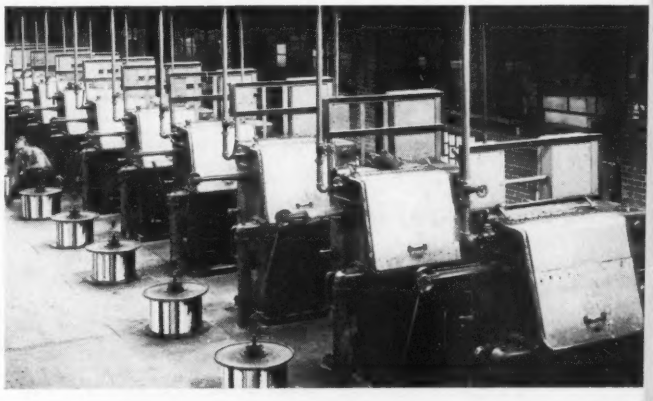
Just as a gyroscope sets a true course with precision and stability, so does our world today govern its course with wire — to maintain its daily living.

SYNCRO wire drawing machines have set a course, too — a true course calculated from precision design and engineering to meet the continuous demand for superior wire.

From Detroit to Delhi, wire and cable mill engineers and production men turn their eyes to SYNCRO. These men know that SYNCRO wire drawing machines produce the best for less. They know too, why the design and performance of all SYNCRO machinery is unmatched: SYNCRO designers and engineers are never satisfied. Constant challenges keep them on their toes!

Delivering the machinery to match the challenges, (and bettering them) keeps SYNCRO on top.

When you need to know, pick up the phone, place your call to SYNCRO — over your part of this world of wire.



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Perth Amboy, New Jersey, U.S.A.

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Better Machinery for the Wire Industry

WIRE DRAWING MACHINES • DIE STRINGERS • CONTINUOUS ELECTRIC ANNEALERS • PAYOFFS • CAPSTANS • WIRE INSULATORS • HEAVY DUTY TAKEUPS • TAPERS • SPECIAL MACHINER

For the FINEST Dies...

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There Are Many Reasons Why V-R Leads The Field!

V-R NEW Cylindrical nib and improved method of assembly insure high degree of concentricity.

V-R . . . First in producing the only Tantalum-Tungsten carbide developed specifically for Drawing Dies.

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V-R . . . First to furnish Carbide Dies rough cored to finish at hole sizes below .010".

WRITE TODAY for NEW Vascoloy-Ramet Die Catalog VR-461.

The New V-R Die Catalog gives complete ordering information on all V-R Dies for drawing wire, rod, bar and tube.

Vascoloy-Ramet CORPORATION

898 MARKET STREET
WAUKEGAN, ILLINOIS

The Wire Outlook

Several factors appear to have contributed to the slump in stock prices. Chief among these is the tight money policy. Doubt among traders as to continuing prosperity, the possibility of a Democratic president (it will have been decided by the time this appears), slightly poorer corporate earnings for 1956 and the Near East's cloudy horizon, all enter into the picture.

However, most prognosticators and industry leaders look for high levels of activity to continue through 1957. Three big business indicators—the automotive industry, steel and construction are all working together at top speed to push up the industrial index.

Motor car sales are expected to exceed those of the current year by a million units, steel is operating at somewhat above capacity levels and construction, in spite of a drop of 11% in home building, is still 2% above last year's totals. New construction—plants, hospitals, schools, warehouses, stores, churches, utilities, office buildings, etc.—is running at the rate of $44.5 billions, as against $43 billions in 1955.

Added to this, sewer and water systems are up 16%, highway building is up 14%, and other public building projects are up, giving an overall increase of 6% for all types. Only 800,000 new homes may be built in 1957 unless mortgage credit terms are eased, although signs are against any possibility of easier money for home buyers.

One reason for the rigid credit terms is the rapid rise in inventory building. Business analysts are always worried when inventories grow faster than new orders, which has been the case since the steel strike was settled.

Employment reflects prosperity. In September there were 66 million people gainfully employed, an increase of 1.4 million workers over September, 1955. Unemployment is put at less than 2 million, which is extraordinarily low.

In non-ferrous quarters, the demand for copper, lead, zinc and aluminum are showing steady increases. Copper wire and insulated wire sales are at high levels, but competition is keen and profits not too good. It may take over 2.3 million tons of aluminum to supply domestic demand next year, in view of which, the Aluminum Producers Advisory Committee recommends that there be no stockpiling during the first half.

There is a good demand for all grades of manufacturers' wire, the spurt in buying by auto concerns contributing to it. The usual seasonal decline in merchant wire products has set in, after a relatively poor year. Welded fabric for highway construction will continue to be a big item in anybody's book. The nail business is good with heavy backlogs on record, particularly for large low carbon grades used in reinforcing construction. Heading wire is moving well and spring wire sales are active. Wire for slide fasteners has been relatively slow.

It is important to remember that stockholders, management and workers are one team. Stockholders' money builds buildings, buys materials and machines and makes jobs; management supplies the guiding hand that makes for the success or failure of an enterprise; and the workers keep the wheels of industry moving by turning out products. And another driving force, competition, makes business progressive.

By and large, the country is in a mood of confidence and contentment. Incomes are breaking all records. Prices are rising, but not interfering with spending. Only the farmers are dissatisfied, but their outlook is better for the coming season.

We should have a good year in 1957.

Edmund Duval Sickels
EDITOR

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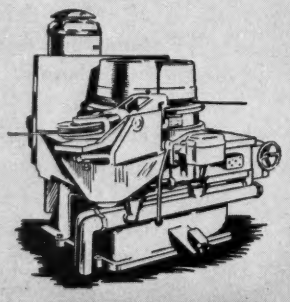
for dependable lubricants... dependable results!

It's fundamental!

1 You hire technicians, you hire engineers who have experience, know-how and integrity... because you know you can depend on them to do their jobs.

2 You buy machinery—from manufacturers on whom you have learned you can depend for quality equipment—manufacturers who stand squarely behind the products they produce.

You know you can depend on them.



Shop foremen who have tried Steelskin lubricants *know* they can depend on Steelskin's consistent quality year after year... know they can rely on Steelskin's uniform composition, and texture. They know that Steelskin gives greater die-life, more uniformity, better quality in the wire products they produce. What's more, they know Steelskin's engineers are always ready to assist them with wire-drawing problems.

It adds up. Better specify Steelskin Wire Drawing Lubricants for your plant.

WRITE TODAY for complete information on STEELSKIN SOAPS and COMPOUNDS.

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WIRE
AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip.
DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 31 November, 1956 No. 11

Control Measures For The Heat Treatment of High Carbon Rods and Wire

by N. Dale Montgomery
Metallurgist, Rod and Wire Division
Pittsburgh Steel Company
Monessen, Pennsylvania

Mr. Montgomery presented this paper at the Annual Convention of The Wire Association in Pittsburgh, Pa., on October 30, 1956. In it he outlines the control measures instituted by his company in annealing, patenting and oil tempering operations.

The control measures instituted by any steel mill in the production of all commodity wire is based on these prerequisites:

1. **Economy of operation**
2. **Avoidance of costly rejections**
3. **Uniformity of performance in the customer's plant**

★ ★ ★

With this goal in mind, we will outline in this paper the various control measures which Pittsburgh Steel Company has instituted for the heat treatment of medium and high carbon rods and wire. Discussions will be limited to annealing, patenting and oil tempering heat treatments.

★ ★ ★

At this time we are producing high carbon commodities which include Regular M.B. Spring Wire; Upholstery Spring Wire for automatic coiling and knotting; Zig Zag Spring Wire for automobile seat and back spring units; No Sag Furniture Spring Wire; Border and Brace Wire; Annealed Spring Wire for heat treatment after forming; Oil Tempered Spring Wire of M.B. and H.B. grades; Rope Wire of Mild Plow, Plow and Improved Plow grades in both bright and galvanized finishes; A.C.S.R. Core Wire; Tire Bead Wire; Redrawn Galvanized Laundry Tag Wire and Welding Wire. Our high carbon grades are the product of the Basic Open Hearth process and are fully killed steels of both fine and coarse McQuaid Ehn grain.

★ ★ ★

Bars and billets for all of these grades are inspected and classified prior to being rolled into rods. Rods for the high carbon commodities can be produced on either our Garrett Semi-Continuous 20-Pass Mill consisting of eight roughing stands and twelve finishing stands in sizes .234″ to .781″, or on our Morgan Continuous Mill consisting of six roughing stands and ten finishing stands in sizes .215″ to .281″ diameter.

★ ★ ★

It is imperative that the rods for such applications be true to commercial tolerances and free from surface imperfections that would impair the performance of the finished wire. Rods for these critical applications are fully inspected and tested prior to further processing and are carefully graded according to the commodity requirements specified by the customer. Testing is performed in our plant by a reverse twist test, and additional inspection is performed by macroetching and a thorough visual examination to make certain that the rod surface is suitable for the end application.

★ ★ ★

Our heat treating equipment consists of annealing furnaces, rod and wire patenting furnaces and oil tempering furnaces.

Annealing

The annealing furnaces are of the box type design with individual inner can covers for each of four bases per furnace. The heat treatment consists of a predetermined time, temperature cycle which may

be divided into three parts: (1) the heating, (2) holding or soaking and (3) the cooling. The entire cycle is carried out using a controlled gas inside the inner sealed cover with a positive line pressure in force throughout the cycle. We are using an oxygen free carbon monoxide gas of approximately 6.0 percent carbon monoxide, with a dewpoint of -40 to -60°F to assure us control of decarburization.

Patenting

The patenting of rods and wire for the processing of the high carbon commodities previously listed requires rigid controls throughout each step of processing. Carbon steels of C-1045 through C-1070 are patented either by the air or lead quench method with the type of patenting being determined by the commodity end use and the mechanical properties which have been specified. Each method of patenting has its advantages, air patenting being economically suited for in-process or breakdown heat treatment as well as for final patenting when a fibrous structure is desired. The lead method, which gives the maximum uniformity of quench and a fine grain structure, is used exclusively for patenting prior to drafting to final wire sizes when the wire must withstand severe forming and bending.

★ ★ ★

Our patenting equipment consists of two combination rod and wire units having a size range of from .1055″ gauge wire to .625″ diameter rods and one wire unit for sizes .080″ through .162″ gauge. The units can be utilized for either air or lead patenting and are heated with natural gas. Lead pans are underfired and the temperatures are controlled by means of thermocouples immersed in the bath. Thermocouples are maintained in a fixed position as the quench temperature of the lead is standardized at a definite point in the bath.

★ ★ ★

The lead furnace on the wire unit is designed with the burner flow adjusted so as to introduce the proper amount of heat to avoid exceeding the control point. This eliminates the necessity of having auxiliary cooling equipment for the maintenance of the correct lead temperature. The two combination rod and wire units require additional cooling of the lead bath because the larger sizes of rod and wire introduce excess heat into the lead. This excess heat is dissipated from the exposed surface of the lead by using a finely dispersed water spray which wets a layer of coke breeze on top of the lead. The coke breeze also keeps the oxidation of the lead to a minimum.

★ ★ ★

The speed of the wire or rod through the furnace is based on the length of soak. An adequate soak is necessary in order to obtain uniform structure and porperties in the quenched rods and wire. Exit wire and rod temperatures of 1680°F. to 1720°F. are maintained and are found to be ideal for obtaining a good patented structure.

★ ★ ★

In view of the critical nature of these high carbon wire commodities, wherein a tensile strength range of 30,000 to 35,000 P.S.I. is specified, it is essential that the mechanical properties of patented rods or wire be predetermined before processing. This is important since the wire drafting practice is generally unchanged. Definite patented tensile strengths, percentages of reduction in area, and elongation ranges are set up in order that the finished wire specifications may be met. The final size of wire being drawn must also be considered when predetermining the patented physical properties since the quench and the cold work effect varies with the size of wire being produced. Representative tests are taken from each round patented to insure that all quality controls are being met.

Oil Tempered M.B. Spring Wire

Oil tempered spring wire is produced to very close and exacting mechanical properties and of necessity must have a sound surface commercially free from injurious imperfections. The application of oil tempered spring wire to the automotive and precision equipment fields of manufacture has in itself established a set of mechanical standards based on uniform quality workmanship.

★ ★ ★

With oil tempered spring wire, as well as all of the many other heat treated high carbon wire commodities, the control of quality begins with the melting of the steel and is followed by a series of processes in which each step is closely controlled. The heating and rolling of the ingots into blooms and billets, the inspection of the semi-finished steel, and the processing of rods and wire into the final heat treated product are rigidly controlled with respect to surface and mechanical properties. This control assures a sound finished wire which will meet the customers' specifications.

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Both fine and coarse grain steels are used in Pittsburgh oil tempered wire. The coarse grain steel is generally applied to sizes .312″ diameter and larger for regular coiled spring application because of the increased hardenability which can be obtained. Fine grain steel is being used on all smaller sizes of oil tempered wire and sizes above .312″ diameter which are subject to severe bending and forming. An example of this is the torque bar spring which is being used on the rear deck lid of the newer model cars.

★ ★ ★

We have two oil temper units on which we can produce wire sizes from .062″ to .625″ with a range of coil diameter from 24″ to 60″. The No. 1 Unit will accommodate sizes from .163″ to .625″ diameter. Sizes .163″ to .274″ are produced on 48″ diameter blocks, .275″ to .406″ on 54″ blocks, and .407″ to .625″ on 60″ blocks. The No. 2 Unit will accommodate sizes from .062″ to .162″ diameter. Sizes .062″ to .080″ are produced on 24″ blocks, .081″ to .125″ on 30″ blocks, and .126″ to .162″ on 36″ blocks.

★ ★ ★

The speed at which the wire is oil tempered varies with the size produced. For example an .062″ wire is produced at 71.6 feet per minute whereas a .500″ wire is run

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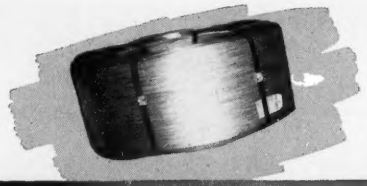

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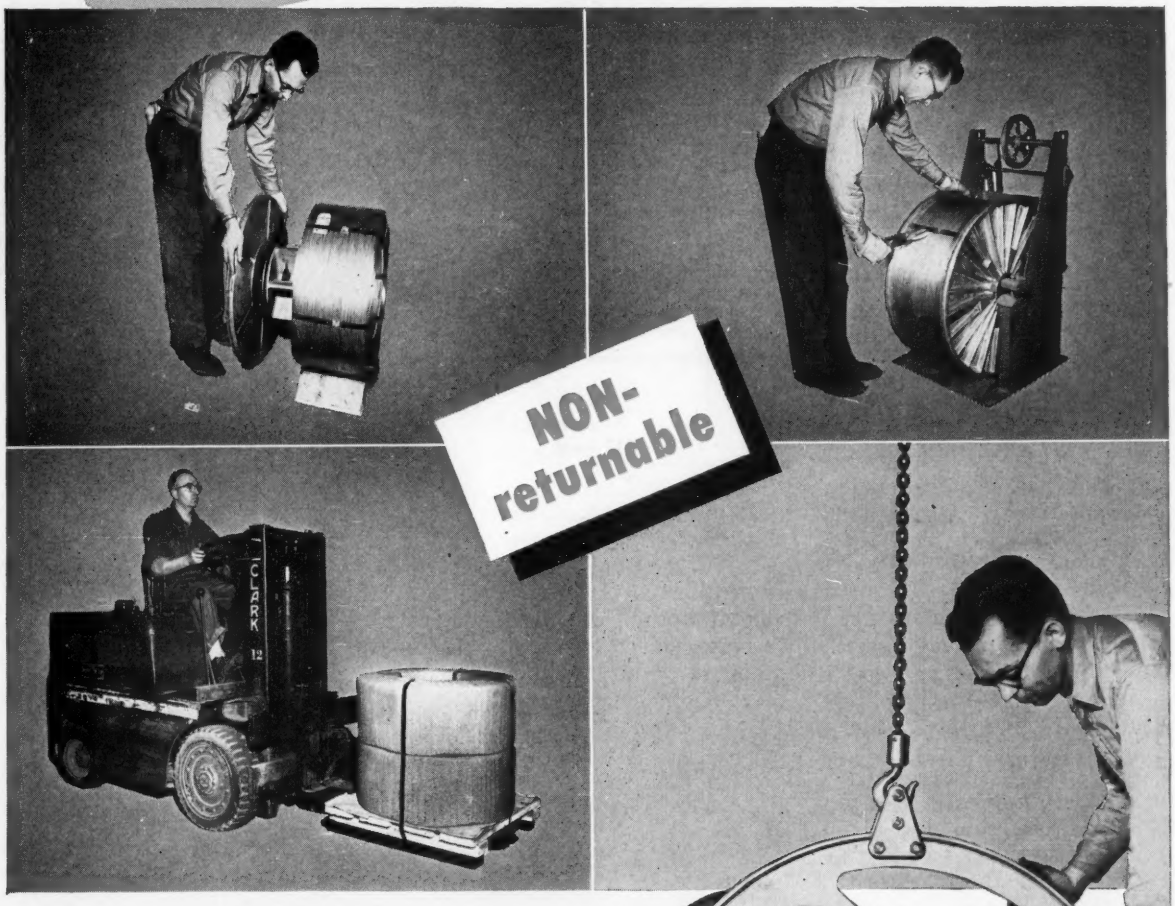

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Take a good hard look at this new plan for shipping big packages of wire because we think you are seeing an economy process of the future projected right into TODAY. No ponderous, heavy reels to ship back and forth—no extra freight charges, maintenance or bookkeeping. Just a fibre core that can be thrown away. We make and sell the demountable head reel-fixtures for let-off and take-up required for processing this package. Also the equipment for handling the coils. Process is proven and in successful use for over a year.

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Steel Wire: Some Recent Developments in Europe

by Reginald S. Brown, M.B.E.
Technical Director
Rylands Brothers Ltd.
Warrington, England

This paper was presented at the Annual Convention of The Wire Association in Pittsburgh, Pa., on October 30, 1956. In it Mr. Brown traces the improvements made in various departments of the wire drawing concerns of Europe, notably in increased speeds, changes in lubricating practices and larger coils.

The period under review has been one of intense activity with full order books and the inevitable pressure on rod supplies. Re-equipment with up to date wiredrawing machinery and galvanising plant has been much in evidence and although there may not have been much of a novel nature, advances in wiredrawing speeds and methods of handling from the block have been notable.

★ ★ ★

A review of this nature can do no more than give an indication of the trend in wire production methods and indicate one or two detailed features likely to be of general interest.

★ ★ ★

Owing to the pressure on rod mills it has not been easy to obtain adequate supplies of 5g. (.212″) rods and there has been a trend towards a rod size of 4g. (.232″) or even larger. This has introduced difficulties with machinery designed for 5g. rods and it is probable that wire machines for mild steel will in future be designed to accommodate these larger gauges as standard practice.

Wiredrawing

There has been a notable advance in speeds of drawing both for mild steel and high carbon steel. This has inevitably focused attention on lubricants which have now changed almost entirely from the sodium soaps, so long favoured in Europe, to the so-called metal soaps some of them being quite highly developed. The following gives some indication of practice in one continental works:—

Mild Steel	
14 swg.	2380 ft. per minute
17 swg.	3150 ft. per minute

★ ★ ★

It is said that at these speeds the lubricant must be selected with considerable care. Speeds of this order are, however, not favoured by all continental manufacturers and the following figures probably represent more normal present day conditions:—

Mild Steel
13 swg.
14 swg.
20 swg.

★ ★ ★

The use of these higher speeds has brought about changes in continuous wire production and the use of static blocks seems to be increasing in popularity. Figure 1 shows a finishing coiler block producing 2,000-lbs. pieces in a very compact manner. The external cage permits the use of a small diameter carrying spider and in consequence the coil can be kept to reasonable dimensions of height and external diameter.

★ ★ ★

Coils of this type are conveyed to the end of galvanising lines, the wire being payed off vertically from the top. This method of overhead take-off is not, however, universally favoured.

★ ★ ★

The necessity to prevent the static block from rotating by holding from the front means that at some stage the machine must be stopped to strip the coil. Methods of overcoming this have been rapidly developing and the geared

Speed	No. of Passes
1400 ft. per minute	5
1800 ft. per minute	7
2000 ft. per minute	

device typified by the Breitenbach coiler has gained much favour. At high speeds it is thought to be undesirable to incorporate gear mechanisms and alternative methods of holding the block have been developed giving truly continuous wire production. In one such case the wire is fed on to a horizontal spider and removed by ram truck.

★ ★ ★

Some attention is being given to the feeding of 5g. rods to these high speed machines. Difficulties with feed are tending to limit the final drawing speed and an inlet speed of 700 ft. per minute would seem to represent the present limit for smooth operation using horizontal flippers. Vertical flippers are now in use for mild steel and these offer an economy of floor space in addition to an increased rate of feed.

★ ★ ★

Wiredrawing machinery is tending to get away from the conventional storage type with overhead wapping off. In England the Marshall Richards Company is producing its well-known "Pathfinder" which is particularly suitable for thicker gauges and high tensile wire. In addition to water cooling, air cooling has been markedly im-

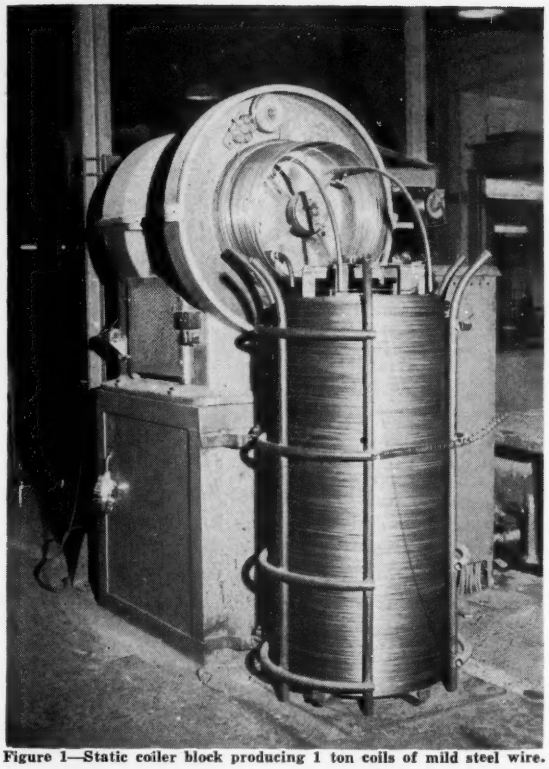

Figure 1—Static coiler block producing 1 ton coils of mild steel wire.

proved and the block to block balancing controller has been simplified making the machine more foolproof in operation.

★ ★ ★

The Barron & Crowther machine achieves the straight line drawing effect by the use of double storage blocks connected by a friction controlled pulley. A photograph of one of these machines installed in Warrington is shown in Figure 2 which illustrates the guards removed from the last block showing the mechanism. Machines of this type are now being installed with coiler spools to carry 2 tons of patent steel wire for feeding the end of galvanising lines. This machine is truly continuously operating as it does not have to be stopped to strip a coil or spool. Three of these machines are at present in use on patent steel wire, capable of finishing speeds as follows:—

Inlet Size	Finishing Size	Speed Ft./Min.
.252″ (3g) max.	.113″ (11g)	600
.179″ (6¾) min.	.080″ (14g)	1200
.212″ (5g) max.	.096″ (12½g)	750
.160″ (8g) min.	.072″ (15g)	1500
.179″ (6½g) max.	.080″ (14g)	1000
.125″ (10¼g) min.	.056″ (17g)	2000

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Experience has shown that cooling is more than adequate and in consequence these speeds could be improved on. These D.C. machines yield a nearly constant weight of output at the speeds given.

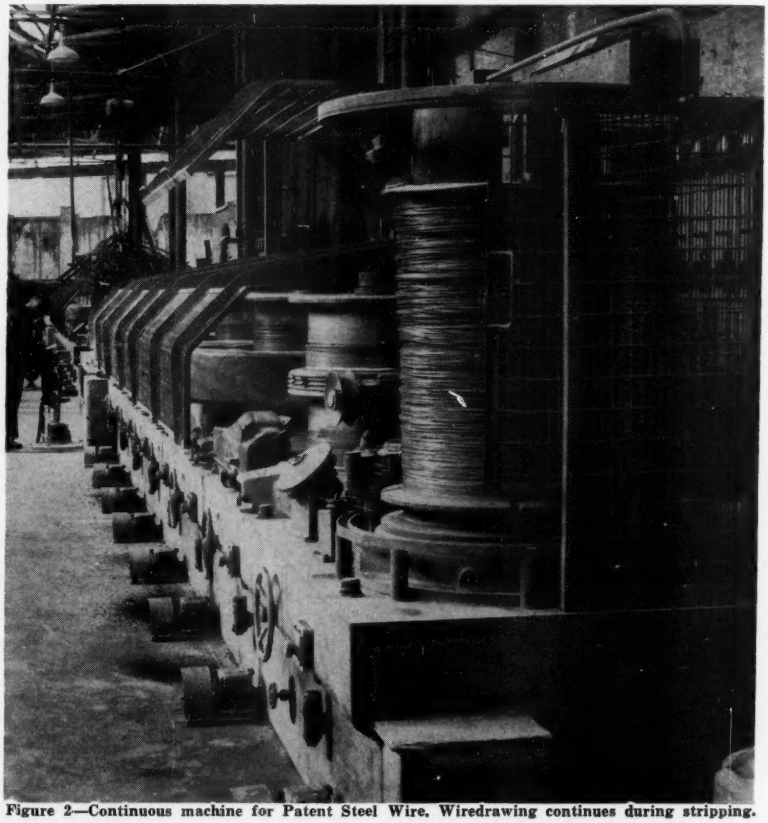

Figure 2—Continuous machine for Patent Steel Wire. Wiredrawing continues during stripping.

Wiredrawing Dies

The overall increase in wiredrawing speeds has emphasised the necessity for improved die conditions. Phosphate coating is helpful but expensive and with a view to improving lubrication, particularly at the inlet die, the British Iron and Steel Research Association have developed a composite die in which a parallel nozzle is fitted to the entrance to produce a greater flow of lubricant — the so-called Christopherson effect. There has been much experimental work on a production scale with this device and although the results are promising the British Iron and Steel Research Association nozzle has not yet come into universal use. Figure 3 shows a typical lay out of a nozzle and die assembly. Using

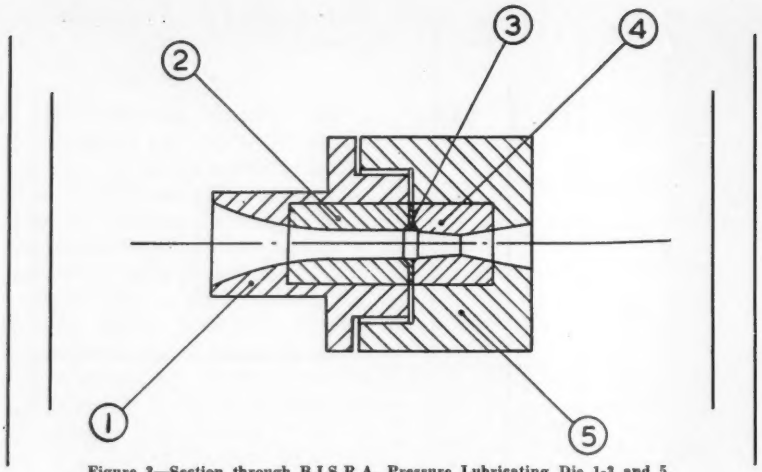

Figure 3—Section through B.I.S.R.A. Pressure Lubricating Die 1-3 and 5, Mild Steel 2 and 4, Tungsten Carbide.

this die in conjunction with a mechanical de-scaling device one British manufacturer is drawing 5g. mild steel rods on a 6 hole machine, the first hole having a 20% reduction and an inlet speed of 200 ft. per minute. The first hole die life is said to be in the region of 200 tons.

Mechanical De-scaling

The principle of mechanical de-scaling would seem to be the same whichever device is used and there is not much to add to the excellent summary by Clemens Eisenhuth given in Wire and Wire Products for the month of April this year. French, Belgian and German manufacturers have been successful in operating mild steel wire-drawing mills by this method but it is reported in some cases that the machines must be run slower than normal and an additional draft introduced. The wire produced from mechanical de-scaled rods has a dirty and unpleasant colour and partly on this account and partly due to considerations of space mechanical de-scaling is tending to be limited to specific applications. A typical example is wire for welded concrete fabric where 3g. (.252") rods have been successfully drawn to 5g. wire (.212") in one pass at a speed of 650 ft/minute. In this case a factor contributing to the excellent die life was the use of a "metal" soap containing graphite.

★ ★ ★

An interesting use of mechanical de-scaling is its application to the manufacture of nails. Mechanical de-scaling devices have already been coupled to wiredrawing behind nail machines on the basis of pilot trials which have proved successful.

Pickling of Rods

Of ever growing concern is the question of waste pickle liquor disposal and in England new pickling installations cannot be undertaken without proper provision for dealing with this effluent. At Rylands Brothers a new sulphuric acid pickling unit has recently been completed in which is incorporated the Nordac system of acid recovery. The use of this system has made it possible to operate 3 interconnected pickling tanks in which the make-up acid is fed to the end of the system and the overflow from the entrance tanks taken via a sump to the Nordac unit where the ferrous sulphate is stripped from the liquor by continuous centrifuge in the form of the monohydrate ($FeSO_4.H_2O$). By this means it is possible to maintain constant concentrations of acid and Iron and there is no loss of pickling efficiency due to working out tanks, dumping and refilling. Working conditions are 12% acid 5% Iron at a temperature of 180°F.

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A view of this new cleaning plant is shown in Figure 4. Particular attention has been paid to

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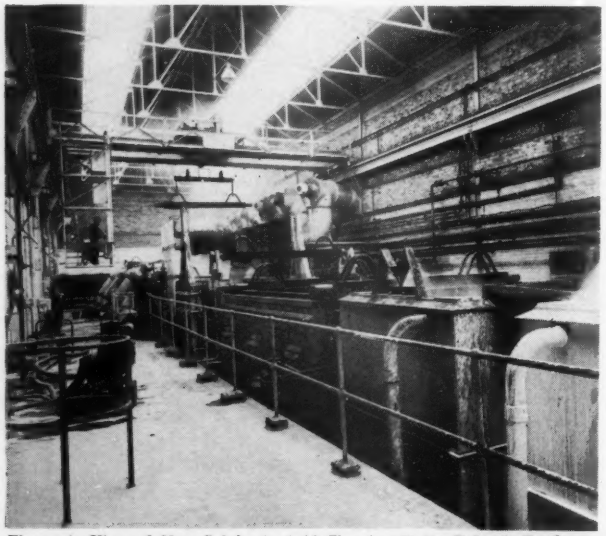

Figure 4—View of New Sulphuric Acid Cleaning Unit. Rylands Brothers, Warrington.

Figure 5—End of continuous patenting and cleaning line Whitecross Company, Warrington, showing blocks for 1 ton coils.

Versatile Plastisols Pace Wire Product Expansion

by D. R. Meserve
Product Manager, Organic Coatings
Metal & Thermit Corporation
Rahway, New Jersey

A material that can add to the attractiveness and utility of a product is of interest to the ultimate consumer and, hence, to the manufacturer. This article describes such a material and its application to wire products.

Wire products are broadening market horizons with a whole host of new applications. Low-cost automatic wire-forming, designers find, can frequently be used more advantageously than sheet metal fabrication. Enhancing this mushrooming popularity is the versatile and fast-growing family of plastisols, which provide protective coatings for wire products.

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Since their commercial introduction about eight years ago, plastisols have been coated on such products as electroplating racks, dish-washing racks, wire chair backs, display racks, hospital-surgical racks, freezer baskets, outdoor guards for electric lights, filter screens, degreasing baskets, strainers, refrigerator trays, and fan housings. One poultry-man even thought of coating plastisol on the wire mesh of cages to reduce egg breakage as well as cut down corrosion.

Plastisols Defined

Plastisols encompass an entire class of alkali and acid resistant, long-lasting vinyl plastic coatings. The term can refer either to the vinyl mixture containing resin, pigment, plasticizer and stabilizer, or to the final baked-on plastic coat.

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Plastisols can be made to serve a wide variety of purposes. The formulation can be adjusted to yield cured films of different degrees of hardness. The pigment can be changed to vary the color. Coating thickness up to 0.25-inch (250 mils) from one dip or 0.06-inch (60 mils) from one spray application can be obtained easily.

Characteristics

One solid reason for applying plastisols to wire products is corrosion protection. In the electroplating industry, for example, plastisols protect screens used in the plating baths as well as racks for holding parts to be plated. These racks and screens have withstood the action of such powerful corrosives as chromic and sulfuric acids. Besides resisting corrosion, the plastisol coating prevents plating the racks and screens; this conserves metal, electrical power, and plating solution.

Fig. 1—Plastisol coating is readily adaptable to mass production of wire products. Here, baskets for commercial dishwashers are dipped in plastisol compound that will protect the wire from corrosion, and then placed on a conveyor which carries the baskets through an oven. * * * * *

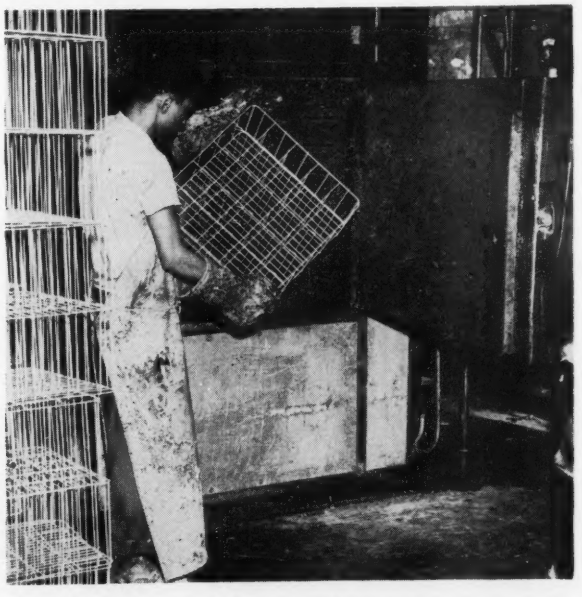

Fig. 2—Baskets are removed from conveyor at the other end of the oven. They now have strong resilient coating of plastisol that will withstand steam, heat, and corrosion in continuous use. * * *

Fig. 3—Wire products can be economically coated with plastisol in small lots, too. Here, shelves for refrigerators and other wire products are plastisol coated by hand dipping in cold plastisol. * * * * *

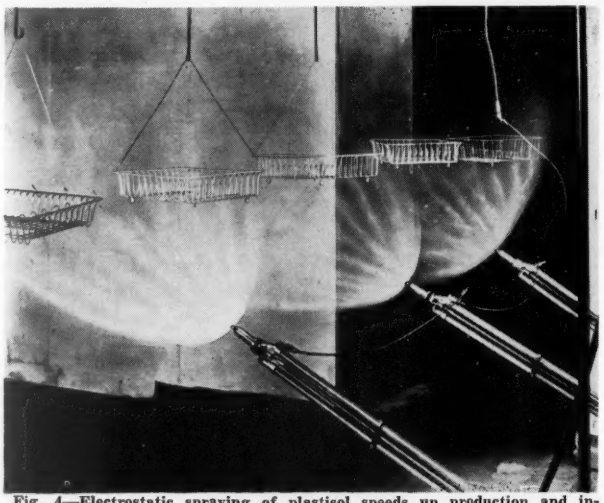

Fig. 4—Electrostatic spraying of plastisol speeds up production and insures an even coat throughout the intricate shape of the products. An electrical charge applied to product and plastisol compound causes the wire to attract the plastisol mist. * * * * * * * *

Although resistance to acids is a significant characteristic, another equally important is resistance to atmospheric corrosion. Plastisols afford low-cost protection from weathering for fabricators of wire garden furniture, ornamental designs, street lampguards, and other wire products for outdoor use.

★ ★ ★

In food storage, attractive plastisol-coated display racks are popular because the plastisol does not absorb food odors. This characteristic is also valuable to fabricators of wire racks for refrigerators.

★ ★ ★

Sound-deadening characteristics of plastisols are important to end-users of some wire products. In hospitals, where noise must be minimized, stacking plastisol-coated surgical racks has become a silent operation.

★ ★ ★

Non-scratch properties of plastisols are also important. A large aircraft plant stores machined parts in inexpensive plastisol-coated wire baskets. Costly sheet metal boxes had been used previously, because bare wire baskets might scratch machined surfaces. The wire baskets are also easier to handle because they are lighter than the sheet metal boxes.

★ ★ ★

Plastisol coatings are especially resistant to abrasion and impact. Even under conditions of severe abuse, plastisols have not chipped or cracked. Should this ever happen, the coating is easily "patched" to make it as good as new. Plastisols adhere well to almost any suitably primed metal. Some coatings—rubber, for example—are extremely difficult to bond to certain non-ferrous metals.

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Other applications utilize the plastisols' electrical characteristics. In electrical components, plastisols insulate with a dielectric strength of about 400 to 500 volts per mil of plastisol thickness.

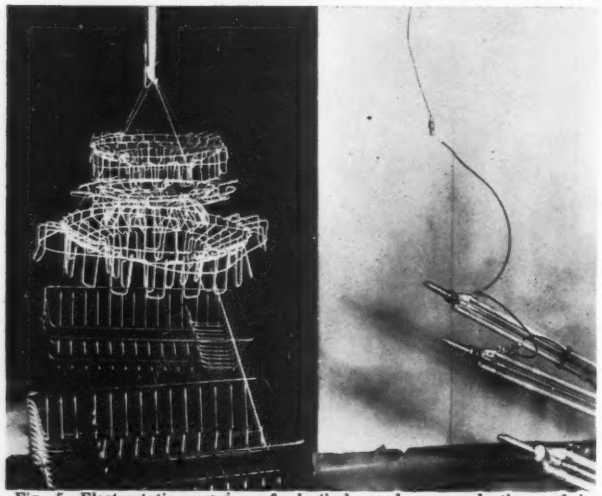

Fig. 5—Electrostatic spraying of plastisol speeds up production and insures an even coat throughout the intricate shape of the products. An electrical charge applied to product and plastisol compound causes the wire to attract the plastisol mist. * * * * * * * *

Fig. 6—Size of products that can be coated by dipping is limited only by the size of the tank. Wire racks and other equipment used in electroplating tanks are commonly plastisol coated to protect them from harsh acids and other plating solutions. * * * * * * * *

Where long life of wire products is the primary consideration, plastisol coats will outlast any of the other protective materials commonly available. Maintenance costs are practically nil; no retouching is necessary, as with painting or lacquering.

Plastisol Coating Processes

Currently, wire product fabricators are using two plastisol coating processes. To date, the dip process has been the most popular, although some manufacturers are interested in the newly-developed electrostatic spray process. In either process a primer is baked on before applying the plastisol. Usually 15 to 20 minutes at 360°F. suffices.

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Two variations of the dip process are used—hot dip and cold dip. With the hot dip method, the wire product is dipped (hot) in a tank containing plastisol. With the cold dip method, the wire product is dipped at room temperature in the plastisol.

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After dipping, the wire products are again baked for 15 to 20 minutes at about 360° F. Exact baking times and temperatures vary depending on the application. Cooling in air completes the operation.

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Hot dipping is preferable when thick coats are desired. On parts with high heat capacities, ¼-inch coats are often obtained in one dip. With the cold dip method, dipping speeds of 17 to 18 inches per minute may be realized, making this method ideal for conveyorized dipping.

★ ★ ★

Physical characteristics of the wire product may decide the method to employ. If the surface-to-weight ratio and specific heat are both high, the wire product may be unable to retain sufficient heat for a hot dip. Different plastisol formulations are required for hot and cold dip methods and for the spray process.

★ ★ ★

In the new electrostatic spray process, a special electrical set up applies a positive charge to the products being coated and a negative charge to the plastisol compound. When sprayed, the plastisol mist is attracted to the wire, covering it with a uniformly smooth coating. Approximately twice as fast as dip-coating, electrostatic spraying is particularly advantageous in coating intricate wire products requiring a fine, smooth appearance.

Practical Applications

A leading wire goods manufacturer spent years investigating organic coatings to protect dishwashing racks. Only plastisols were found to combine all the characteristics deemed critical: low-cost and durability, with resistance to abrasion, scratching, and color absorption.

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Previously, this manufacturer turned out bare wire racks with wood liners to avoid scratching expensive dinner-ware. But soaking in water softened the wood; before long it splintered, cracked, and broke away. In addition, food particles and odors clung to the wood, making the liners difficult to clean as well as unsanitary.

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After many years of investigating protective materials available to the industry, a hot-dip plastisol was tested. Favorable laboratory reports encouraged full-scale field tests under typical operating conditions.

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For two and a half years, plastisol-coated racks were used in hotels, restaurants, and hospitals. At the end of that period, the plastisol coatings were found to be absolutely unchanged—far outranking the performances of competitive materials. Today, after five years, the same coatings are still in excellent condition.

★ ★ ★

In another case, a manufacturer of glassware cut costs and gained increased corrosion protection by using a plastisol to replace beeswax for coating steel baskets. The baskets are used to retain glassware during etching.

★ ★ ★

Glass etching requires the use of highly corrosive hydro-fluoric acid. To withstand the acid, this manufacturer had invested in expensive stainless steel baskets. Even though coated periodically with beeswax, the baskets were soon put out of service. With plastisols, ordinary steel replaced stainless for the baskets—and the life of the baskets more than doubled.

★ ★ ★

Plastisols also helped a large automotive manufacturer eliminate maintenance costs on degreasing baskets. Originally, rubber coatings were used. Subjected to severe abrasion and impact damage, these coatings seldom survived for more than a few months. Because of the high cost of maintaining the short-lived rubber, plastisol was substituted on trial. After three years of heavy production work, the plastisol was still undamaged.

Plastisol Variations

Plastisol formulations have been developed to meet a variety of applications. The formulation that coats one product satisfactorily may not be the best for other products.

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Currently, the manufacture of plastisols is a highly intricate and exacting process. Each of the four basic constituents—the resin, stabilizer, pigment and plasticizer—must be combined in just the right amount and in the right manner for a specific application. Among other things, the formulation depends on the coating process to be used, and on the physical characteristics of the product to be coated.

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In addition to the type and amount, quality of the constituents is critical. Undue variation in purity, density, distillation range, or viscosity of constituents or of the raw mix can radically alter the characteristics of the resulting coat.

(*Please turn to page* 1389)

Summary of Remarks on Epoxy Enameled Wires

by Harry L. Saums, Technical Director
Anaconda Wire & Cable Company
Muskegon, Michigan

Mr. Saums delivered a talk at the meeting of the Wire and Cable Section of the National Electrical Manufacturers Association at the Westchester Country Club at Rye, N. Y., last April. This summary of his remarks is published through the courtesy of NEMA and with the permission of Mr. Saums.

To be successful, any enameled magnet wire must meet the requirements of four main considerations:

1. **The** liquid enamel must be capable of easy, low-cost preparation. The various batches must be reproducible. The tank life of the material should be as long as possible. If the material changes, it should be readily recognizable in the liquid stage.

★ ★ ★

Formvar Enamel is outstanding in this respect. Epoxy Enamel is good, but it does tend to have a somewhat shorter tank life. So far, we have not lost any batches of liquid enamel, but storage life has to be limited to a matter of a few months. We think Epoxy Enamel is satisfactory to this first degree.

★ ★ ★

2. **The** enamel must be capable of application to the wire, using the equipment which the manufacturer has. Preferably, it should be applied in the same manner as Formvar or Plain Enamel. This means, easy dependable low-cost manufacturing operations, which turn out uniform, high quality wire at low cost.

★ ★ ★

Both Formvar and Epoxy Enamels are outstanding in this respect. We have found that the Epoxy Enamel may be somewhat superior because it is very easy to apply.

★ ★ ★

3. **The** enameled wire must be capable of easy, low-cost winding into the coils which are suitable for it. That is, the winding operators must be able to wind the material using much the same techniques that they employ with other wires. There is no question but that Formvar is the most outstanding product of this type. Epoxy wires that we have seen may not be quite as good, but they are sufficiently good.

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The wire must be capable of being stored, handled and shipped under all sorts of weather conditions, and in general, require no special packaging or handling precautions. Epoxy enameled wire meets this requirement in every detail.

★ ★ ★

4. **The** device made of the wire must be capable of fulfilling its intended function over a lifetime that is long enough to be economically sound. This lifetime will vary with the device. Some devices might require a life of 10 years or more, while others may give a very satisfactory life measured in hours.

★ ★ ★

We have found that Epoxy wire is definitely Class B 130°C, capable of giving a life of 20,000 hours plus at this temperature. In other words, the wire must last as long as it takes to write off the cost of the device. This we feel Epoxy will do at temperatures of 130°C for long time life and as high as 165°C for shorter life periods.

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We have also found that Epoxy wires are not sensitive to reacting in an undesirable manner with moisture or other insulations which might come in contact with them. It does not appear to be necessary to publish a list of "Do's" and "Don'ts" regarding the choice of an insulating system. In other words, Epoxy enameled wire is compatible with almost any sort of electrical insulation which might be used with it and which we know about today. This statement is true at the elevated temperatures mentioned in this report.

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The wire is of pleasing appearance, has a good color and glossy surface, and is smooth and pleasant to the touch.

★ ★ ★

It has been used abroad for the last five years. The materials for making it are in common and low-cost supply.

Story of a gal who couldn't cook

(or why use ELGIN Diamond)

When Susie walked down the street strange things happened. Men winked, wives frowned, cops whistled and cabbies tooted. Susie was a dish—charm in carload lots—sweet but shrewd, lovable but aloof.

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Electroplating Wire of Small Dimensions

by Warren Schmidt, President
City Plating Works, Inc.
Bridgeport, Connecticut

This article describes the procedure followed by the author's company in plating wire parts or wire in continuous lengths, one of their specialties being chrome plating.

Electroplaters, who handle all types of plating, receive occasional requests to plate pieces of unusual shape, unusual combinations of plates on a given piece or unusual sizes of pieces, either extremely large or almost minutely small.

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Two such requests involve the plating of small diameter wire and of very narrow metal strip of slight thickness, both of which are supplied on reels or spools in 1000-foot lengths and must be plated without cutting.

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These two requests present the same type of problem to the plater, who must first determine whether the plate, in the thickness called for, will withstand without flaking, the type of bending to which the plated wire or strip will be subjected in its ultimate application.

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Next, the length of time to deposit the required thickness of plate must be determined. This time period will determine the length of the tank containing the plating solution and the speed with which the wire or strip must be carried through the solution. Many combinations of tank length and speed of wire through the solution can, of course, be determined to give satisfactory results.

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The choice will undoubtedly be made after a survey of available tanks and the selection of one that will best provide the required plating time at some selected speed of movement of the wire through the tank.

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A constant-speed motor is necessary to pull the wire through the solution and wind it on a take-up reel after it leaves the tank. The motor speed is cut down by a train of pulleys and a Boston speed reducer. The take-up reel upon which the plated wire is wound must be wide enough to prevent any appreciable build-up of its diameter by the added wire and thus change the speed of the wire through the solution.

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As the plated wire leaves the solution and before it is wound on the reel, it must be dried free from any solution to save it from stain spots and possible corrosive action. Holding an absorbent cloth around the wire before it reaches the reel will suffice.

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Another important feature which must be considered in the plating layout is the design of the anode, which supplies the electric current to the product being plated. It should distribute the current uniformly to the entire length of the wire in the tank. In the layout being described in Fig. 1, but not shown in that figure, ⅛" x 1" copper strips were hung on wood

(*Please turn to page* 1387)

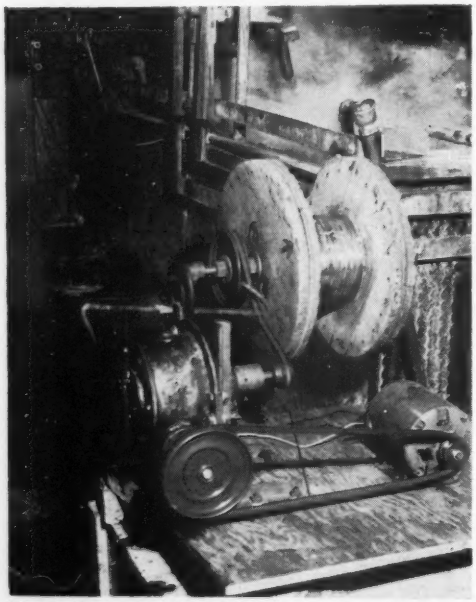

Fig. 1—Shop set-up for plating wire continuously. * *

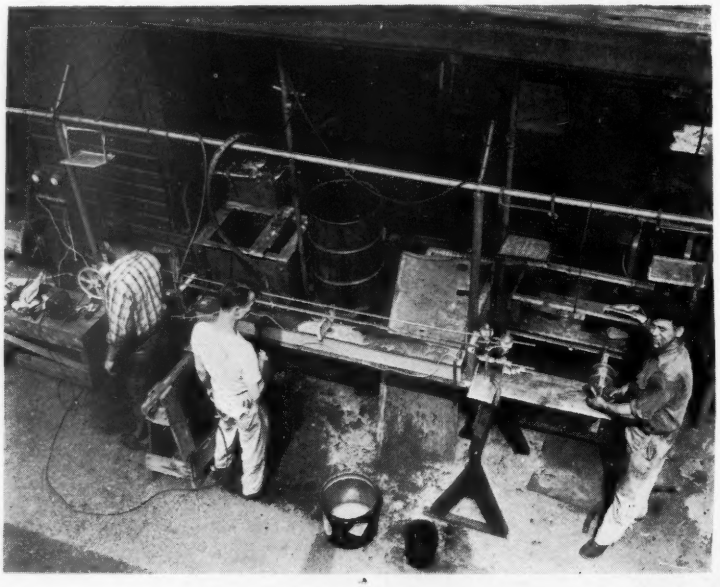

Fig. 2—Special S/U continuous wire plating for Army Ordnance. * * * * *

Isotope Tracer Methods Developed In Great Britain

Courtesy of the Shell Refining and Marketing Company, Ltd., England

The use of isotopes in the wire industry is in its infancy, but enough has been done to indicate practical and widely different applications. This article, describing experiments made to determine die wear in drawing wire, was specially written for Wire and Wire Products.

Radio-active tracer methods are finding increasing use in wire-drawing research in Great Britain. They seem particularly suitable for assessing die wear, since by "labelling" the wire the investigation can be greatly shortened.

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The radio-active tracer technique was first attempted in England at the Thornton Research Centre of the Shell Refining and Marketing Co. Ltd., to be followed by another investigation in Germany. In both investigations, tungsten-carbide dies were irradiated at the British Atomic Research Centre at Harwell, England, so as to produce certain tungsten- and cobalt radio-isotopes. The pick-up of same by wire drawn through the radio-active die was used as a measure of die wear. In the following the method used by the British research workers will be described in some detail.

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In their "Study of Tracer Methods" the research workers I.C.E. Button, A. J. Davies and R. Tourret describe their attempt to make a die radio-active by neutron irradiation. Preliminary radiography showed the die wear to be erratically distributed. A counter method was therefore developed to integrate the radio-activity of each length of wire. An abbreviated illustrated excerpt is given in the following from the above paper.

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For studying the friction-reducing properties of wire-drawing lubricants, an experimental vertical drawbench had already been installed at Thornton Research Centre. In it, lengths of approximately 6 ft. of 17 s.w.g. copper wire are drawn through an 18 s.w.g. tungsten carbide die, by the action of a weight. To increase the scope of this apparatus it was decided to attempt to employ it for die wear measurements.

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Calculations based on the increase in the bore of dies in industrial use indicated that the die wear to be expected was of the order of 2×10^{-8} g/ft. length of copper wire. It would therefore be necessary to draw approximately 10^4 ft. of wire for an increase in die bore of 10^{-4} in. which is about the minimum increase measurable with reasonable accuracy. It was impracticable to draw such an amount of wire with the apparatus available, thus eliminating the possibility of estimating die wear in the laboratory by the increase in die bore.

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If the assumption were made that all, or a constant proportion of, the die wear debris was retained at the surface of the wire, it seemed that a radioactive tracer technique was feasible for detecting the minute amounts of wear products involved, and might thus be applied to the measurement of die wear. The die through which the wire was drawn was a typical carbide die (tungsten carbide held in a sintered cobalt matrix), as it lends itself readily to such a method, because its constituents form suitable radioactive isotopes under neutron bombardment.

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It was decided to endeavour to use the short-lived high-activity tungsten isotope W^{187} rather than to allow this to decay and then to use the other isotopes. The die insert, which weighed approximately 6 g, is composed mainly of tungsten and cobalt in the ratio of about 10:1 and after irradiation for one week it has an activity of about 500 mc, which necessitates adequate screening. The die is accordingly housed in a lead castle which reduces stray radiation to a safe level both when in transit and when in use of the drawbench.

Development of Technique

The use of an autoradiographic method for detecting wear debris on the drawn wire was investigated first, on account of its extreme simplicity. The copper wires drawn through the active die were cut into lengths of approximately 10 in. and placed in contact with X-ray film in a light-tight holder. The first holder consisted of a Tufnol (phenol-formaldehyde) plate with grooves milled on one face to accommodate the lengths of drawn wire, the top surfaces of the wires being flush with the lands of the plate, on which lay the film held down by a light-tight spring-loaded lid. Preliminary tests showed that when a film was placed in direct contact with the Tufnol, a faint image of the lands resulted, which was attributed to chemical interaction between the Tufnol and the photographic emulsion. The effect could be prevented by placing a thin polystyrene sheet between the film and the Tufnol. This holder suffered from a number of practical defects, (e.g. the wires, which were rarely quite straight, were easily displaced from the grooves in the plate), and a new fixture was therefore con-

structed in which lengths of wire could be securely clamped at either end, and straightened and aligned in one plane by being tightened over two parallel transverse rods (Fig. 1). The holder was loaded with wires and film placed in a light-tight box, and a suitable exposure given. For wires autoradiographed immediately after drawing through a freshly irradiated die, an exposure time of 18 hrs gave workable image densities. A typical autoradiograph is shown in Fig. 2, from which it is apparent that the wear, as revealed by the radioactive deposits, is erratically distributed along the wires. For a

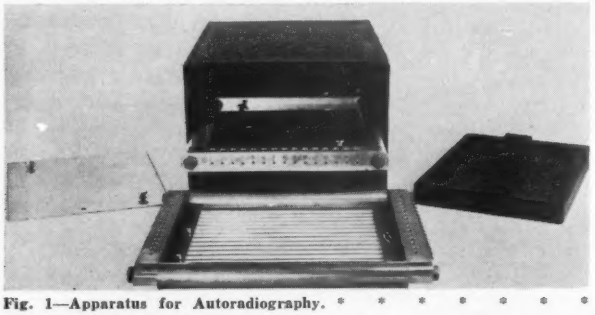

Fig. 1—Apparatus for Autoradiography.

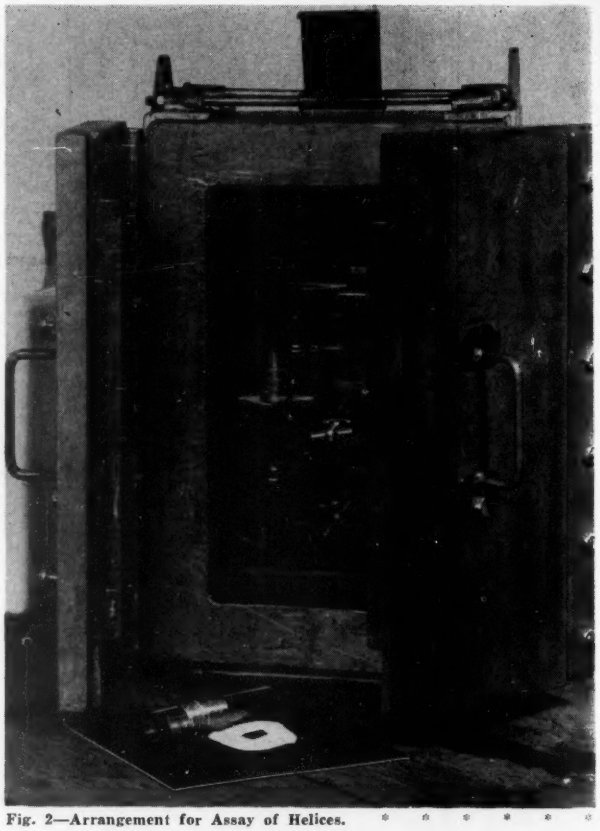

Fig. 2—Arrangement for Assay of Helices.

6 ft. length of wire the drawing speed varies from zero to about 650 ft./min., but the autoradiographs disclose no trend in wear rate over this speed range.

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The autoradiographs reveal three distinct types of wear deposits, which are referred to here because of their influence on the development of the technique, although their implications are discussed later. The types are:

(a) **Fairly uniform wear deposits showing as a general background along the positions occupied by the wires, tentatively attributed to cobalt.**

(b) **Discrete spots, of much greater intensity than the general background, occurring either singly or as non-uniform groups, tentatively attributed to particles of tungsten carbide.**

(c) **Groups of uniformly spaced discrete spots, extending over about an inch of wire, occur occasionally.**

Concentration and Integration of Wear Debris

The erratic distribution and varying size of the wear debris particles made it apparent that the autoradiographic method was unsuitable for accurate quantitative comparison of different wear rates. The simple autoradiographic technique thus gives a qualitative rather than a quantitative picture of the wear, in which, as regards technique, the significant feature is the wide variation of the amount of debris between one short length of wire and another. It was therefore necessary to draw a much longer total length of wire and to integrate the wear products over this length in order to have any hope of obtaining a significant value for the mean wear rate. A photo-metric method of integration using autoradiographs was first visualised but was not developed because of the instrumentation and other difficulties foreseen.

Helix Method

During experiments, the opportunity was taken to test a preconception that the radiation from the wires as drawn would be too weak to give a useful counting rate; in fact a counting rate well above background was obtained. It was therefore decided to investigate the activity recorded when the G-M tube was inserted into a well-fitting close-wound helix formed by a single-length of wire. The first wire assayed in this manner gave a readily detectable counting rate of about 45 counts/sec., which may be compared with the result obtained by stripping the active debris from five lengths of wire, which gave an average activity per wire of about 22 counts/sec. No quantitative conclusions can be drawn from these figures, but some difference in activities is to be expected from differences in geometrical arrangement, different amounts of wear products on individual wires and incomplete electrolytic stripping. With this encouragement, it was decided to abandon further attempts to aggregate the wear debris from a number of wires, and to examine the possibilities of the more direct method in which a single wire was close-wound into helix form and assayed by placing it over the envelope of the G-M counter.

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It was foreseen that one limiting factor in the use of this method would be unevenness in the distribution of wear products around the circumference of the wire. Tests were made to assess the importance of this effect, with the aid of a perspex fixture which located thirty short equal sections of wire in a squirrel-cage formation coaxial with the G-M tube. The total length of wire was about 12 ft. By rotating the wires in their locating grooves through 180° about their own axes, tests were made of the variation in circumferential distribution of wear particles, typical rate-of-count meter readings being shown in Table "A".

TABLE "A"

Test data—Circumferential wear distribution

Lubricant	Test No.	Rate-of-count meter readings: Mean readings counts/sec.	Number of readings	Standard deviation counts/sec.	Remarks
A	1a	13.51	60	1.65	
A	1b	14.35	60	1.53	Same wires as Test No. 1a. Each wire rotated through 180°
D	2a	33.40	60	3.24	
D	2b	29.07	66	5.68	Same wires as Test No. 2a. Each wire rotated through 180°
A	3	49.3	60	9.11	New set of wires.

The use of wires wound in helix form appeared to be the most promising method and was adopted for further tests. In the standardised procedure each wire was wound into a close helix of 26 turns, into which the G-M tube was inserted. Thus, by locating the coil at a predetermined position along the axis of the tube, a closely controlled geometrical arrangement was achieved. To minimize the risk of contaminating the counter with active material from the wire, a thin polystyrene sheath (10^{-3} in.), which was renewed for each wire assayed, was placed between the helix and the G-M tube. An annular paper disc was similarly used between the helix and the axial locator. The arrangement, with its lead castle, is shown in Fig. 2 and was used in conjunction with a scaling unit.

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It still remained to determine whether the remaining uncertainty in the geometry of the helix and G-M tube would introduce serious variability of counts, and whether the coiling process might cause the loss of a variable proportion of debris.

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As a check on any variation in counting rate when the position of the helix was altered relative to the G-M tube, certain helices were reversed and reassayed. Typical results are presented in Table "B," from which it is seen that a significant variation does occur.

TABLE "B"

Test data—Effect on counting rate when helix reversed on G-M tube (Test Series No. 2)

Wire No.	Initial Activity counts/sec.	Activity after reversal, counts/sec.	Difference, % initial activity
1	100.33	111.56	+11.2
8	17.23	17.11	− 0.7
13	35.61	37.24	+ 4.6
50	75.29	85.35	+13.4
53	99.43	111.85	+12.5
62	70.34	69.18	− 1.6

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It is possible that this may be due to the occurrence of a very active particle or group of particles at one end of the helix, causing an appreciable difference between the radiation scattered into the counter according to whether this end is adjacent to or remote from the iron axial locator. The differences between counts when helices were replaced without reversal were considerably smaller.

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A number of helices were unwound and then rewound and reassayed to investigate how tenaciously the wear debris was retained on the wires. The results are presented in Table "C".

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It may be seen that in some cases a marked decrease in counting rate occurred after rewinding, but it was generally considerably less than the variations between wires reported later under "Results of Wear Tests." There are two probable reasons for such decreases:

(a) In rewinding, two of the original 26 turns of the helix had to be discarded, and it is possible that due to the erratic disposition of the wear particles a large deposit was taken away with the turns removed.

(b) The uncoiling and rewinding process was more drastic than the careful original winding, and it is also possible that it com-

TABLE "C"

Test data—Effect on counting rate of rewinding helices
(Test Series No. 2)

Wire No.	Initial activity, counts/sec.	Activity after rewinding (corrected for turns ratio and decay since initial count), counts/sec.	Difference, % initial activity
70	42.10	38.2	— 9.3
92	63.30	56.6	—10.6
105	74.57	56.3	—24.5
120	39.15	37.6	— 3.9
145	185.30	129.8	—30.0
164	74.86	29.2	—61.0

pletes the removal of wear particles which were merely loosened in the original winding process.

Design of Experiment

It was clear from the erratic occurrence of wear debris that, in the wear tests, as many wires as possible should be drawn, although this number was limited by the half life of the W^{187} isotope, and the rate at which wires could be drawn and assayed. In practice wires could be drawn faster than they could be assayed because of the time of counting required to achieve accuracy.

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The count for each wire was converted to the value it would have had at the time of assaying the first drawn wire, assuming a 24-hr. half life. This assumption was justified by the decay curves of a few representative wires.

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Two other decisions had to be made before the design of the experiments could be finalised. One was, whether to study drawing speed as a variable; in the previously mentioned absence of any evidence of a systematic effect, and in view of the complication of subdividing each length of wire, and the added difficulty in analysing the results, it was decided to concentrate upon differences between lubricants irrespectively of drawing speed. The second arose from the difficulty of clearing away one lubricant in preparation for tests with another; the best way of doing this appeared to be by washing out and then removing the last traces of the influence of the previous lubricant by actually drawing wires using the new lubricant. The first few wires so drawn were almost certainly incompletely representative of the new lubricant, but by randomising the order of using the lubricants, their inclusion in the tests does not invalidate the results and may contribute information.

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In the scheme adopted, each of three lubricants believed to have widely different performances as regards industrial die life was used repeatedly in random order, five wires being drawn on each occasion.

Results of Wear Tests

In the first series of tests a total of 95 wires were drawn and assayed. The results of these tests were inconclusive and a second series of 180 wires was completed in a similar manner after re-irradiation of the die. The total number of disintegrations recorded for individual wires ranged from approximately 83,000 for the very active wires drawn early in a series, to 4,000 for the lower activity wires drawn at a later time; the corresponding standard deviations of counts thus ranged from approximately 0.4% to 1.6%.

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In general, the decay curves were as expected from the known radioactive constituents of the die material. The curves for a few representative wires are shown in Fig. 3, in which lines with a slope equivalent to a 24-hr. half life are drawn through the experimental points, over the period of the wire drawing tests. The close fit over this period justifies the assumption of 24-hr. half life in the decay corrections. The early portion of the decay curve of the first wire in the first series exhibited a rather steeper slope than anticipated. This could be accounted for by the presence of an isotope with a half life less than the 24-hr.

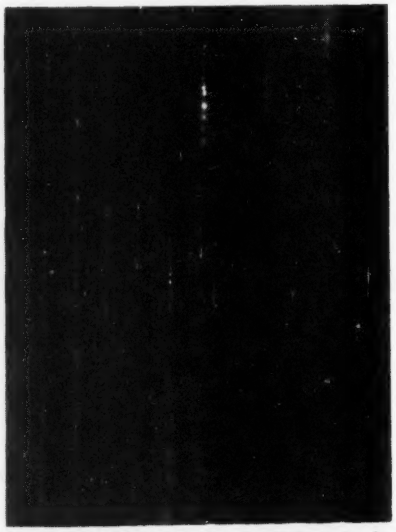

Fig. 3—Autoradiograph from samples of wire drawn through Radioactive Die.

W^{187}, and suggests the possibility of the existence of a film of radioactive copper Cu^{64} (half life 12.8 hrs.) in the bore of the die. Such an isotope could have arisen from copper left from wires which had been drawn prior to irradiation, and it may be that this active film was removed when drawing the first few wires through the activated die, being gradually replaced by non-active copper. An attempt to determine the multiple regression coefficients of this decay curve in order to confirm the presence of such a copper isotope proved unsuccessful.

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The results of the two series of tests are illustrated graphically in Fig. 4 in which the ordinates represent the activities of individual wires in counts/sec., corrected for dead time, background and decay,

whilst the abscissae represent the order of drawing wires. The wear appears to vary with order of drawing, as is emphasised in Fig. 5 by the envelopes enclosing the points; the lower is reasonably well defined, and the upper is a replica of it with ordinates multiplied by an arbitrary factor of 3.5. The envelopes so derived enclose 92% of the points and demonstrate that the latter are more widely scattered at high activities than at low. It may be that there is a possible link between the first and second series of tests, as the sequential wear variation appears to follow through the two series; the envelopes as drawn are continuous in this respect. It should be realised, however, that although the two series were performed with the same die, it is unlikely that the pile factors were exactly equal for the two irradiations, while the activity of the cobalt constituent in the second series should be approximately double that of the first series, as the time elapsing between the two irradiations was small compared with the half life of cobalt.

By assuming that the general level of the wear rate from Fig. 5 gives an activity of 150 counts/sec. a rough estimate may be made of the rate of removal of material from the die. Assuming that the helix arrangement gives a geometrical factor of 1/3 and beta particles from W^{187} only are recorded, this leads to an estimate of about 3×10^{-8} g of die debris per foot of wire, which confirms previous estimates.

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A wide range of variation exists between the activities of individual wires. It is probable that wires of high activity are those having a comparatively large number of tungsten particles or particles of abnormal size in the wear debris, whilst wires of low activity might be those having fewer tungsten particles in the wear debris, a greater proportion of the activity in the latter case being due to cobalt.

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An analysis of variance for each series indicated that there was no

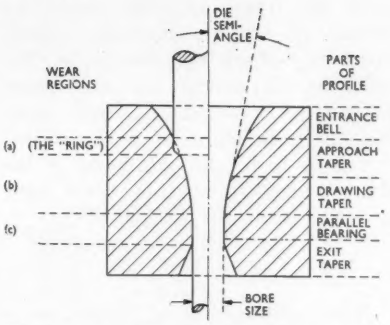
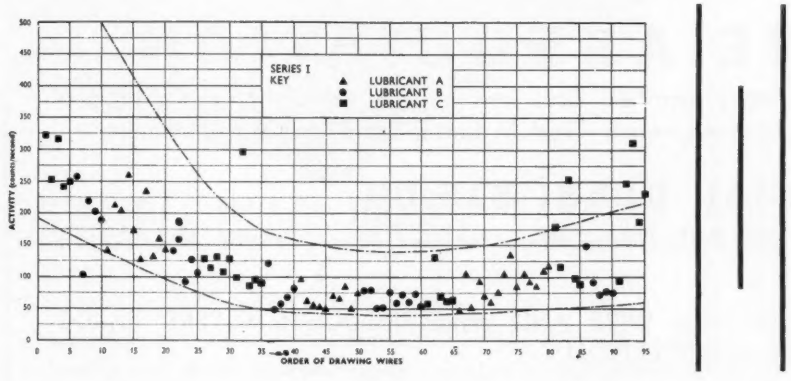


Fig. 5—Cross-section of typical Tungsten-carbide insert for a wire-drawing die. * * * *

discrimination between lubricants in these tests, one possible explanation being that any such differences are obscured by the sequential variation of the wear rate. Statistical refinements to separate the effect of the latter are under consideration. It may be noted that in the two series the total length of wire drawn (about 1,600 ft.) although nearing the upper limit on our laboratory scale, represents a production time of about 1 min. only, on a high-speed industrial draw-bench. This therefore raises the question as to whether a uniform die wear rate may be expected within such a period which represents so small a fraction of the useful life of the die.

Discussion

The radioactive technique as applied to the problems of die wear has adequate sensitivity to detect the small amount of wear debris involved and its use in this work is notable in that it is the first known occasion when the minute wear deposits from a tungsten car-



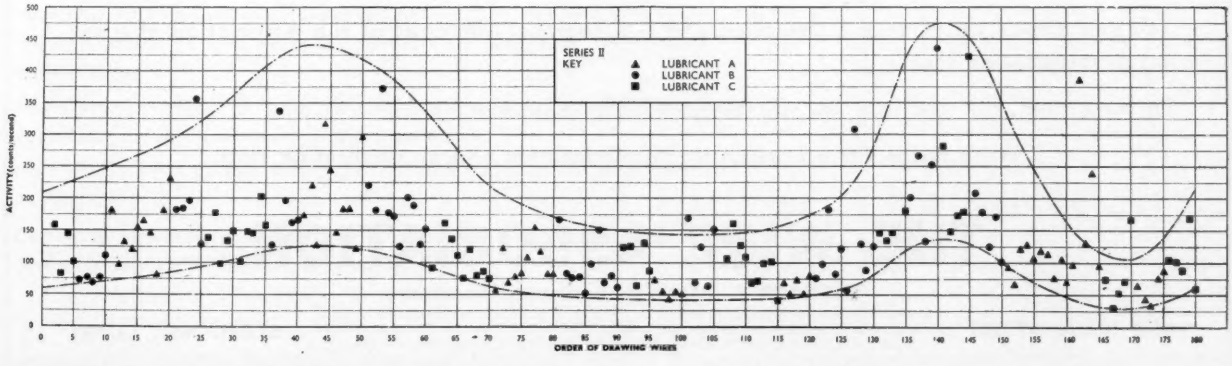


Fig. 4—Graphical presentation of results of wear tests. * * * * * * * * * *

bide die have actually been detected on the drawn wire. Apart from any other considerations, the erratic distribution of the wear products revealed in this way makes it difficult, or perhaps impossible, to predict die wear in industry from laboratory tests such as have been described.

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The usefulness of such tests seems rather to lie in the investigation of the fundamental processes of die wear and they provide some information on the nature of the wear mechanism, which previously has only been conjectured. The autoradiographs reveal no marked variation in the rate of wear or the nature of wear deposits over the range of drawing speed employed, suggesting that speed may have no effect on the mechanism by which wear occurs. The fairly uniform background of wear deposits appears to be chiefly cobalt eroded from the die by the polishing action of the wire and is probably from regions (b) and (c) of the die (see Fig. 5). The erratically distributed particles superimposed on this background may be of tungsten carbide plucked out of the die, and these will have come almost entirely from the "ring" region (a) since heavy wear occurs there in practice. The groups of uniformly spaced particles, which occur occasionally, suggest a stick-slip mechanism possibly coincident with the natural frequency of some part of the apparatus; their occurrence is unrelated to drawing speed.

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The counting experiments show clear evidence of a sequential variation in the rate of wear. The effects of lubricants are thus rendered more difficult to distinguish, which, together with the extremely short total length of wire drawn, may account for the apparent lack of differentiation between them in the present tests.

Acknowledgments

Thanks are due to the Directors of "Shell" Refining and Marketing Co. Ltd. for permission to publish this paper and to their colleagues, especially **Dr. J. W. Drinkwater** and **Mr. J. R. Williams** for their valuable help. Thanks are due, also, to the staffs of A.E.R.E. Harwell, Isotopes Division, and of the Research Laboratory on the Physics and Chemistry of Surfaces, Cambridge University, for helpful discussions and permission to quote their estimates of wear rates.

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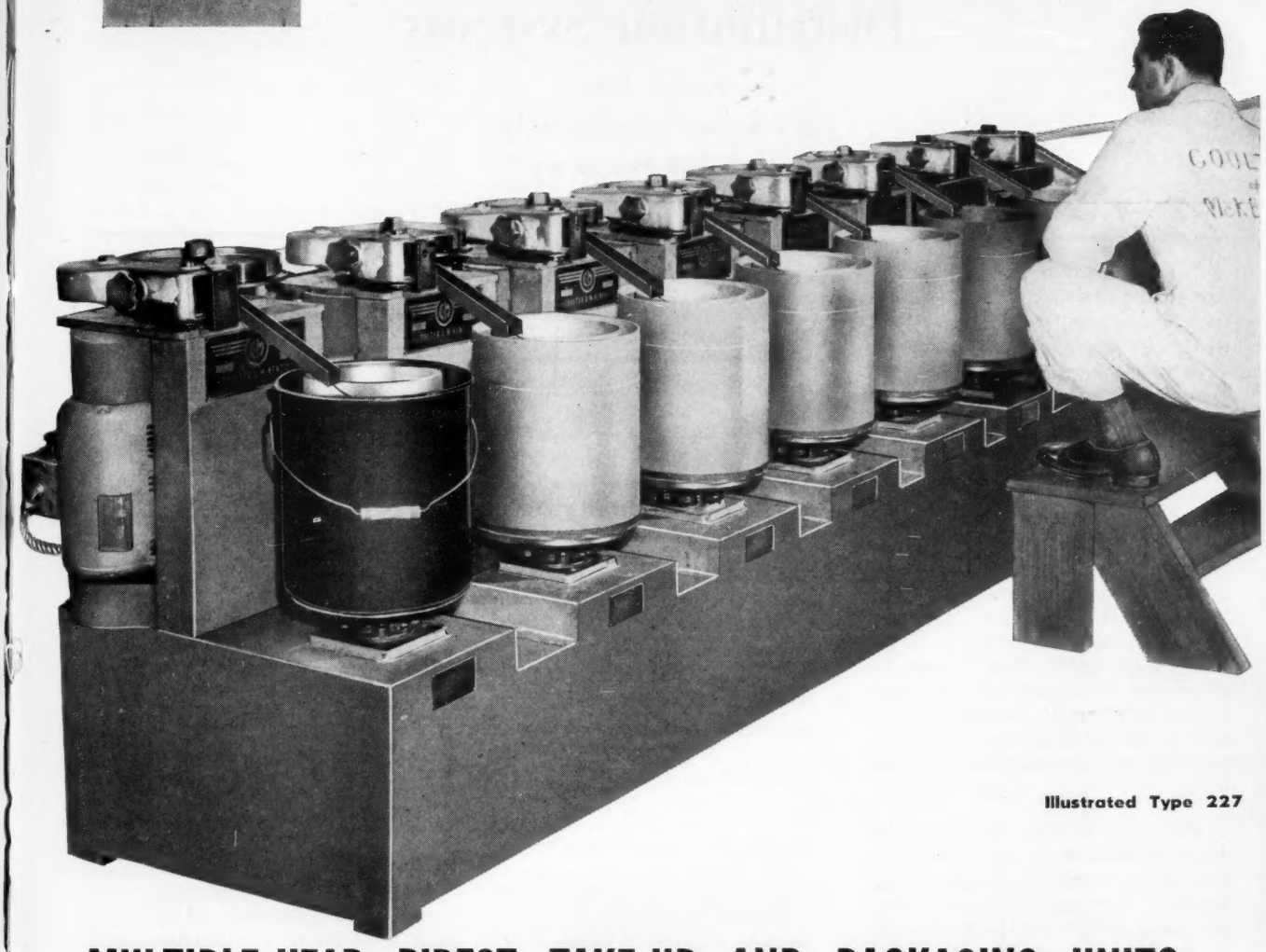

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Rural and Urban Wires for Telephone Distribution Systems

by A. P. Jahn

Bell Telephone Laboratories, Inc.

Murray Hill, New Jersey

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Rural, according to the dictionary, means pertaining to or suggesting the country, the opposite of urban. Urban, by the same dictionary, means the opposite of rural. We might, theref ore, expect rural and urban distribution wires to be radically different, or opposite, from each other. This is not the case. The two wires were conceived in much the same manner, are quite similar in make-up, and the equipment and techniques for installing rural or urban wire are the same. The two wires are designated B Rural Wire and B Urban Wire respectively. The B does not stand for better or best, it is not a class or grade marking. It is merely an index or code for ordering and for specification purposes.

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The main physical difference between the wires is that rural wire has six pairs of No. 19 gauge conductors whereas urban wire has 16 pairs of No. 24 gauge conductors. Both wires are, in effect, sheathless self-supporting cables for exchange distribution plant. Rural wire is used in relatively long runs for extending or reinforcing open wire lines in sparsely settled areas. Urban wire is for short runs for distribution of circuits from feeder cables in the more densely populated areas where drop wire is sometimes inadequate and cable too costly. In the following Table I are shown the comparative physical and electrical characteristics of the two wires.

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A few years ago the Michigan Bell Telephone Company pointed out their urgent need for a multipair wire facility of low installed cost for use where population density is low. For extending service in these areas, long distances must be traversed with a small group of circuits. The facility had to be suitable for installation on existing pole lines already carrying so many open wire circuits that it would be difficult or impossible to add open wire pairs without extensive rebuilding of the line. Long spans would frequently be encountered. Above all, the facility had to be low in installed cost.

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B Rural Wire was developed to fulfill these requirements. It consists of six twisted pairs of insulated annealed copper No. 19 AWG (0.036 inch diameter) conductors cabled around an insulated .109 inch extra high strength steel sup-

TABLE I

Physical and Electrical Characteristics	B Rural Wire	B Urban Wire
Conductor - Annealed Copper	19AWG .036"	24AWG .020"
Conductor Insulation - minimum thickness	.015" Poly. .007" PVC	.020" PVC
Number of Twisted Pairs	6	16
Support Wire Insulation - minimum thickness	.018" Poly.	.018" Poly.
Support Wire - Steel, Extra High Strength - diameter	.109"	.109"
Breaking Strength - pounds	1800	1800
Diameter of Completed Wire	0.60"	0.65"
Weight per 1000 feet - pounds	120	135
Length of Wire on Reel - feet	4100	3600
Resistance - Ohms/1000 Circuit Feet	16.4	52
Mutual Capacitance Wet - UF/1000 feet	.024	.046
Mutual Capacitance Dry - UF/1000 feet	.012	.023
Attenuation Wet - db/1000 feet at 1000 Cycles*	.31	.75
Attenuation Dry - db/1000 feet at 1000 Cycles	.23	.55
Insulation Resistance - Megohms 1000 feet Wet	5,000	100
Breakdown Voltage - Conductor to Support Wire - Between Conductors	20,000	20,000

*Note: "Wet" attenuation is for completely immersed condition. Suitable figures for engineering purpose would be intermediate, perhaps .28 db for rural and .66 for urban under average conditions.

port wire. Each conductor is insulated with polyethylene followed by an outer covering of polyvinyl chloride to provide added toughness during installation and to provide color coding for ring, tip and pair identification. Originally, the rural wire was made with a black PVC compound because no colored compounds then available had satisfactory weathering properties. Fig. 1. shows the black rural wire.

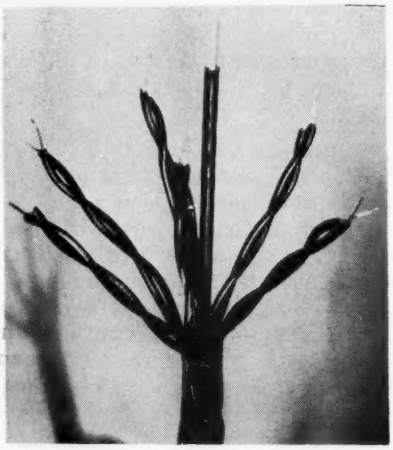

Fig. 1—All black B Rural Wire. * * *

When colored compounds satisfactory for outdor use were developed, the jackets on B Rural Wire were changed to employ these compounds. The insulated conductors are twisted into pairs of different twist length to keep down crosstalk. The support wire is insulated with polyethylene which provides adequate electrical breakdown strength between conductors and the steel wire. Fig. 2 shows the color coded rural wire, the black wire being mated in turn with blue, red, green, brown, slate, and yellow.

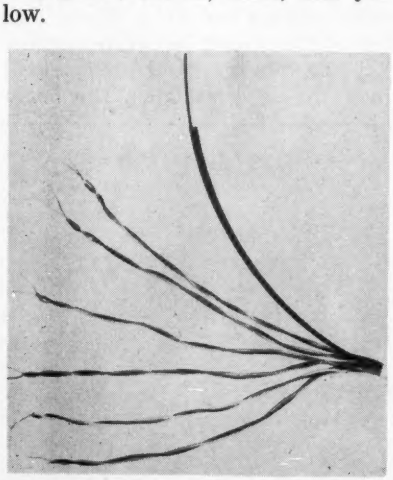

Fig. 2—Colored B Rural Wire. * * * *

The advantages which this type of wire possesses over the conventional type of small cables are headed by the fact that it is self-supporting. Because of its sheathless construction, splicing and terminating are simple operations requiring no costly or elaborate sealing techniques. From a transmission standpoint, the primary concern with wire of this type is the change in its characteristics between dry and wet weather conditions. In general, moisture increases capacitance, conductance and attenuation and decreases impedance, cutoff frequency of loaded wire, capacitance unbalance, and carrier frequency crosstalk. These matters present some problems in the widespread use of the wire. However, the B Rural Wire may be used in ordinary subscriber loops pretty much as though it were regular sheathed 19 gauge cable, including the use of H88 loading. It can be used for distances of about 10 miles, except where a signalling limit may further restrict the usable length of the B Rural Wire. When used for trunks, the recommended type of loading is B44, that is 44 millihenry coils at a spacing of 3,000 feet, in order to avoid any penalty due to the low cutoff in wet weather that would result from use of H88. Fig. 3 shows the loading coil case with loading coils and wire in place.

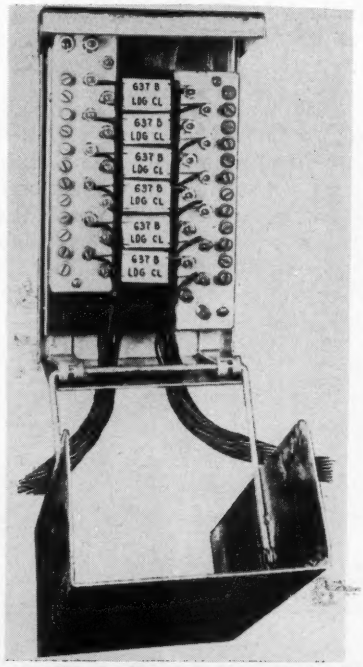

Fig. 3—177A Loading Coil Case with Loading Coils and Rural Wire. * * * * *

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That there was a need for this wire and that the developed wire met the requirements for a low cost facility is amply attested by the fact that over 40,000,000 linear feet of B Rural Wire were used during 1954, its first full year in the Bell System. The 1955 usage of this wire will exceed the 1954 figure by 50 per cent.

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The success achieved with rural wire led to a request from the Michigan Bell Telephone Company for a similar, but different, wire for urban distribution use; something cheap to take the place of lead-sheathed block cable but which would not require expensive splicing and wiping at terminals. The conception again is a multipair sheathless self-supporting cable. With every pair accessible at every point for subscriber taps, the wire would give complete flexibility in multiplying to provide party line or individual service at any location. It is felt that in this respect, 16 pair wire of such a type would be equivalent to 26 pair sheathed cable.

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The wire which was developed is called B Urban Wire. It consists of 16 twisted pairs of polyvinyl chloride insulated No. 24 AWG (.020″) annealed copper conductors stranded around an insulated extra high strength .109″ steel support wire. The insulated support wire is the same as is used for rural wire. The conductors have distinctively colored insulation for pair, ring, and tip identification. The colors for the pairs in numerical sequence one to sixteen are obtained by mating blue, green, brown, and slate successively with white, red, black, and yellow. Thus, each pair has a different color combination from any other pair. Fig. 4 shows the color coded B Urban Wire. Eight different lengths of pair twists are used. The pairs are bunched into four groups and stranded around the support wire, without previous bunch stranding or binding, i.e., they are laid in parallel. No two pairs in any bunch

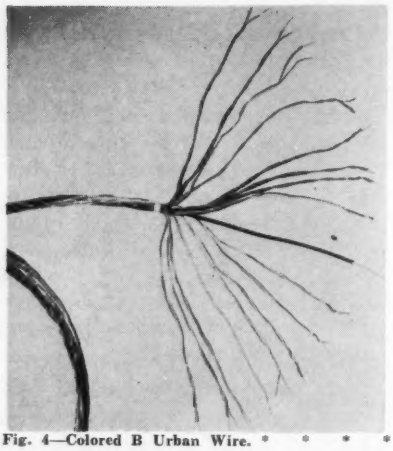

Fig. 4—Colored B Urban Wire. * * * *

have the same twist length and the bunches are so arranged that there are no adjacencies of the same twist length. Such an arrangement appears satisfactory from the standpoint of capacitance unbalance and crosstalk. An overall spaced serving of nylon or orlon yarn binds the wire tightly to hold all pairs in place and minimize damage to the wire during installation. From a transmission standpoint this wire has the same undesirable variation of electrical characteristics with weather as does rural wire. The attenuation of urban wire at voice frequency (1,000 cps) is 0.75 db per 1,000 feet wet and only 0.55 db when dry. For general engineering purposes, transmission characteristics representative of gentle rain rather than an immersed wet condition are used for both Rural and Urban Wires, and in terms of attenuation, this is about 20% higher than the dry condition.

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The choice of polyvinyl chloride instead of polyethylene for conductor insulation on urban wire was made partly because of necessity. Color coding is, of course, a requirement for this type of wire and was available for severe outdoor exposure only in polyvinyl chloride compounds. In the case of rural wire, the colored polyvinyl chloride is used as a jacket over the polyethylene insulation, but it was felt that such a double extrusion job would be too costly for urban wire. Because it is used in relatively short lengths, urban wire can tolerate the high dielectric constant of PVC (about 5.6 for this compound). For rural wire, the use of a black polyethylene with the low dielectric constant of about 2.5 was desirable to keep down capacitance, attenuation, size and weight. The problem of outdoor exposure of this wire required the selection of a weather-resistant vinyl base and coloring pigments of the highest permanence. Weather resistance in the compound is achieved through the use of dibasic lead phosphite as a heat and light stabilizer and the incorporation of a high percentage of a treated titanium dioxide as an ultra-violet shield. It is anticipated that the insulation so formulated will have a physical life of at least 15 years under service conditions. The color pigments have been chosen to remain identifiable throughout the life of the insulation. Refer to Table I for the characteristics of the two wires.

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Both wires may be terminated in regular terminals with 6 or 16 pair binding post chamber and this is the usual practice at end points. At intermediate points, these wires have special advantages over cable or open wire. The sheathless construction plus full color coding, common to both rural and urban wire, facilitates all operations incident to the connection of drop wire for subscriber loops. From the standpoint of termination or bridging, the ready accessibility of each pair makes these wires different from sheathed cable. Open wire is, of course, as accessible throughout its length for bridging as is either urban or rural wire, but has not the closely bunched conductors of these wires. Therefore, to fully exploit the potential advantages of these new facilities, a new type of terminal was necessary.

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A small one-pair terminal has been developed which can be clamped to the support wire and used to bridge a pair of wires. This terminal, coded 105A, has a molded phenolic base about 2 1/4 inches in diameter, in which two binding posts and a mounting detail are encased. It is fitted with a molded neoprene snap-on cap to protect the connections against rain, moisture and insect. Fig. 5 is a sketch which shows the binding posts and contact parts of the terminal, and Fig. 6 is a view of the various parts of the terminal used in the field trials.

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To install the terminal on urban wire, the pair of conductors to be terminated is separated from the group and guided tangentially past the binding posts. The terminal is then clamped to the support wire. The binding post assembly consists of a threaded stud with a flat narrow anvil, and appropriate common washers and nuts. The size of the contact area between conductor and pressing surface is kept to limits so that when the lower

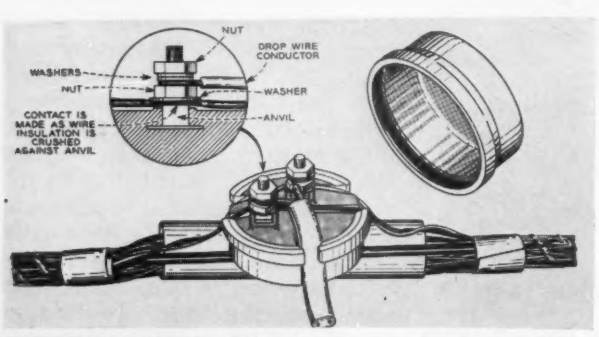

Fig. 5—Sketch of 105A Terminal Parts. * * * * * * *

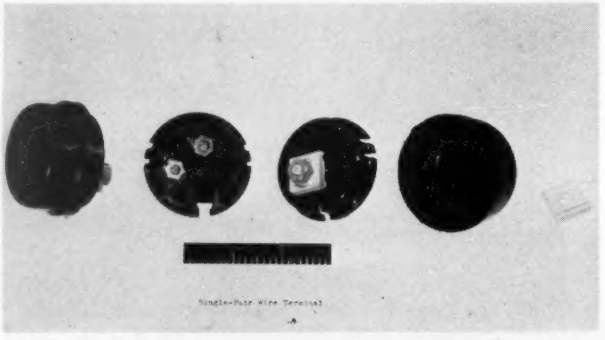

Fig. 6—View of the Parts of the Terminal used in the Field Trials. * *

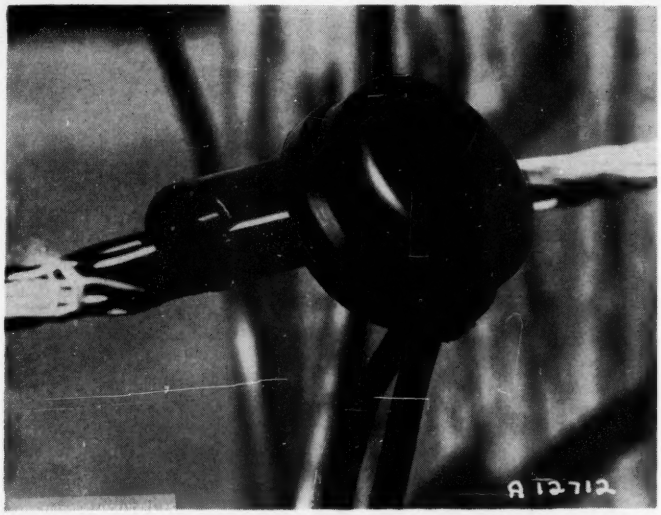

Fig. 7—105A Terminal Used in the Field Trials on Urban Wire. * * *

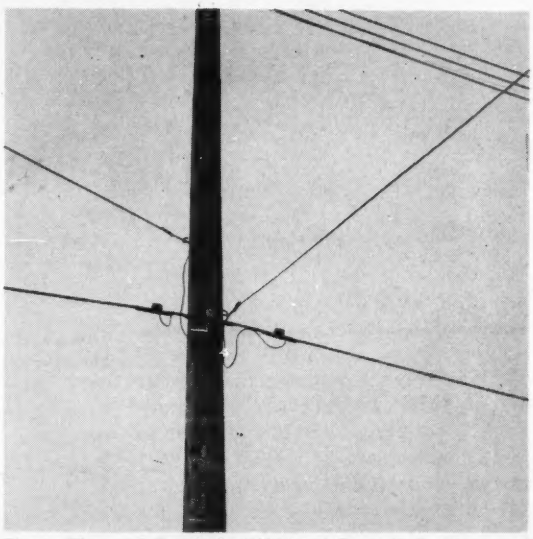

Fig. 8—View of 2 Terminals (105A) and Drops in Service. * *

nut is tightened with the ordinary standard tool, a metallic contact is made through the insulation.

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When used on rural wire, the installation of the terminal is made in the same manner except that it is necessary to remove insulation from each conductor.

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The drop wire leading to the customer's station is attached above the lower nut of the binding post assembly. It is inserted edgewise through a keyhole slot in the terminal base and given a quarter turn into a locked position. A second drop wire may be accommodated by removing a small knockout portion in the block. In Fig. 7 is shown one af the terminals used in the field trials (with 2 service drops) in place on urban wire. A typical installation of the 105A terminal with two terminals and two drops is shown in Fig. 8.

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B Rural Wire and B Urban Wire are designed for rapid and inexpensive installation. This can usually be done by crews of two men. Installation procedure is essentially the same for both wires. They are almost alike in weight and diameter and may be used with the same span lengths and sags, although shorter spans will ordinarily be encountered in urban distribution. The wires may be used in spans up to 250 feet in heavy loading areas, 400 feet in medium loading areas, and 450 feet in light loading areas.

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Dead-ending of the support wire may be by the wrap method or on a thimble eyebolt or on a dead-end bracket. A standard one-bolt clamp with one half of the clamp reversed is used to hold the skinned support wire at dead-ends.

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For intermediate points, a simple type of bracket, in the form of a J, is used as a saddle for pulling in the wire and as a point of attachment after the line has been tensioned. The bracket is made in two forms, one for pole attachment and one for attachment to the cross-

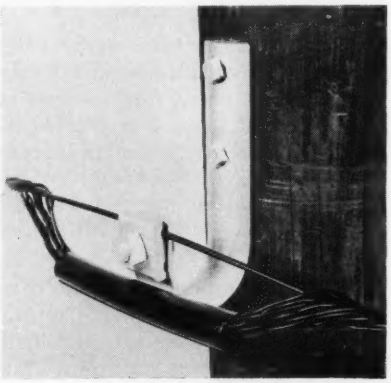

Fig. 9—Wire Bracket on Pole. * * * *

arm. Fig. 9 shows the Wire Bracket on a pole and Fig. 10 shows the Wire Bracket on a crossarm. The short leg of the J has a single square hole to accommodate

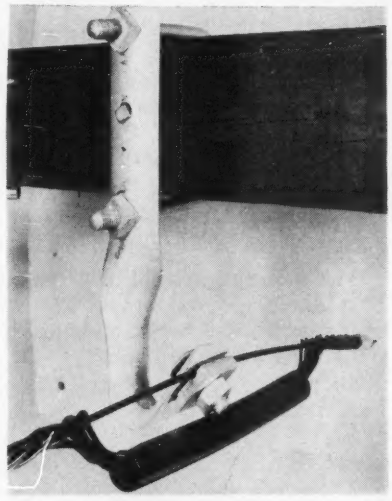

Fig. 10—Wire Bracket on Crossarm. * * *

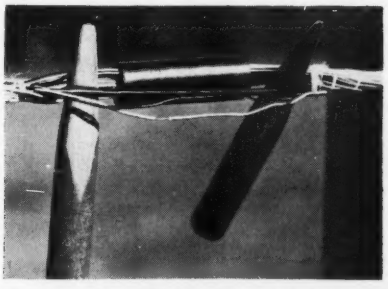

Fig. 11—Wooden Wedges in Use on Urban Wire.

a carriage bolt, on which is fastened half of a standard one-bolt clamp. The insulated support wire is gripped in the groove of this clamp. The conductors are separated from the support wire, bunched, and enclosed in a short length of split polyethylene tubing

(*Please turn to page* 1385)

Sixty Miles of Wire Drawn From One Pound of Copper

General Electric at Schenectady has been drawing copper wire for many years. This story emphasizes the fine wire drawing for the manufacture of magnet wire.

The purest commercial copper which man can refine is precision-drawn into high quality industrial wire at the rate of more than half a million miles a year at **General Electric's** wire mill in Schenectady.

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Operated by the company's Medium Induction Motor Department, the wire mill is one of the oldest in the world producing this high quality magnet wire. The mill has drawn an estimated 12 million miles of wire in its 76 years of operation.

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The principal use is in the coils of electric motors where the requirement is for high conductivity wire occupying the smallest possible space. Made for use where heat and space are factors, some types of insulated wire will operate effectively at temperatures up to 482 degrees F—more than double the boiling point of water.

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The mill draws approximately 700,000 pounds of copper wire each week—representing a mileage equivalent of more than four times around the earth. Sizes of the finished wire range from about one half inch in diameter down to strands so fine it would take three to equal the average diameter of a human hair.

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Sixty miles of this finest wire (.001") are produced from a single pound of copper.

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Starting with coils of 7/16-inch diameter copper, the factory may produce the one-mil size in a series of drawing operations using as many as 49 wire drawing dies. The coils are 300 feet long when the process starts—and some 10,000 miles long when completed.

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The factory uses approximately 6,000 industrial diamonds ranging up to 1½ carats each in drawing wire to desired thicknesses. Diamonds are used because of their superior wearing characteristics. Wire drawing dies of tungsten carbide are also used for drawing wire sizes down to 1/16" in diameter.

High Purity a Factor

Only by reason of its high purity can the copper wire be drawn fine enough for modern applications. Copper is the only known metal meeting this requirement so well and yet that is economical enough to use. Some aluminum wire is also made in the plant, but it takes up more space than wire made from copper and its electrical conductivity is only about 62% of that of copper. Silver has a higher conductivity than copper, having a conductivity of 105, but is economically impractical to use on a large scale.

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The mill produces more than 2,500 kinds and sizes of wire, and insulates the finished products with combinations of materials including synthetic enamels, cotton, silk, glass, paper, glass-asbestos, silicone, and acetate tape. On the finest wire the insulation film does not exceed a maximum thickness of two ten-thousandths of an inch.

The Schenectady wire mill is one of the world's largest manufacturers of magnet wire insulated with Alkanex*, a new synthetic developed by General Electric, which is said to represent the most significant advance in the past 20 years in the continuing search for wire insulation of smaller bulk and higher heat resistance.

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Before the wire is drawn, the coils of copper rod are "pickled" in a solution of sulfuric acid to remove a thin, oxidized layer which appears as a black coating.

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The surface is then shaved by a special process invented in the mill several years ago that is now widely used throughout the industry. As it comes from the shaving machine, the copper has a bright lustre and is free from surface defects.

Output Speed

Wire from eight-thousandths to two-and-one-half thousandths inch in diameter is drawn at speeds of over 5,000 feet per minute. The fine wire is lubricated with a soap and water solution and the larger sizes with beef tallow, which the mill uses at the rate of approximately 400 pounds a week.

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The mill expects its copper wire output this year will be around 30 million pounds. If it were all drawn to the minimum size it would reach out three billion miles —or the equivalent of more than 6,500 round trips to the moon.

* GE Trademark

Wear on Nail Manufacturing Machines and Its Effects

by A. Mai

This article appeared in a recent issue of Draht-Welt and is published with their permission. It was translated from German into English by Jerome W. Howe, member A.S.C.E., Worcester, Mass.

Dr. Howe believes that some of the author's statements may be questioned, but that readers will find value in the discussion. No illustrations were used in the article, which may lead to some question on certain allusions, especially since some terms used may be translated into one or more English terms. He has tried, however, to use the more understandable expressions.

After a certain period, differing according to good or improper care during use, defects appear in the machines, which have as a consequence an increased percentage of rejects. The experienced operator tries in every way to compensate for the defects in order to maintain as far as possible the quality of the product. The less practiced operator, however, is not able to eliminate the difficulties with expedients such as shims and the like. In spite of all his pains he gets insufficient output of inferior quality, besides a high percentage of useless rejects. No direct fault can be charged against him, since the rejects must be attributed to the permanent disarrangement of machine parts and tools, caused by advanced wear.

* * *

With defects of this kind, the skilled mechanic will attempt to rectify them with shims and wedges of sheet metal, etc.; the less skilled operator works under great limitations, and at lease a partial overhauling of the machine is required, if indeed the wear on all moving parts is not so great that a complete overhaul is necessary.

* * *

Above all, with rapid presses, wear becomes especially noticeable because of high R.P.M., the individual operations must intermesh exactly. Wear causes retardation of one or another operation which may be hardly noticeable for smaller lots, but in the production of larger lots will occasion serious difficulties. Such are: unequal lengths, wire buckling, etc., which by hand operation are not observed, but at full rotative speed lead to kinking of the wire being fed, especially after installing new dies with sharp V-notches in the grooving. Also crooked heads and/or one-sided points, in spite of attempted corrections, where we must distinguish between vertical and horizontal obliqueness, may have other causes; for example, insufficiently tightened cutting die and heading hammer.

* * *

Adhering point scrap with simultaneous alternately varying cut may commonly complete the circle of occurring defects, for by this time there cannot be any longer a question of an unobjectionable production and product.

* * *

The new machine worked satisfactorily and the operator is surprised when here and there it begins to hitch. But usually he does not attribute great significance thereto, so long as the product is still acceptable, for superior specimen nails are to be seen as such for only a short time after the readjustment of the machine, that is, after the installation of new tools. A certain displacement or wear of the attached tools occur even with new machines, and therewith follow a minimal dislocation of the head and point without prejudice to the quality of the nails produced as articles of commerce.

* * *

Only when, shortly after a readjustment, pronounced displacement occurs in spite of corrections, even if all screws and nuts are drawn tight, is the search made for the cause. And this is imperative, so that the attention of the operator can be directed to the maintenance of the quality of production of all the machines, instead of dealing with correction to one or another machine which will after a short time prove to be working poorly. That costs time, labor and nerves, and brings unnecessary vexation if the product is found fault with by the inspector, as is bound to happen.

Cleanliness and Lubrication Essential

It must be assumed, in the first place, that the machines will be kept clean under all circumstances, grease nipples and oiling holes kept open and in order, so that parts will actually receive lubrication. Of course this should be done and yet it is, as all know, in spite of instructions, not always practiced. It is often enough unhappily discovered through smoking rollers, eroded bearings and other moving parts, jammed straightening rolls, etc., when the damaged parts are dismantled, wear exists, that those parts have been run dry. Careful lubrication must be insisted upon, especially when production is by changing shifts, because here the machines are tended by one operator after another.

The First Sign of Wear

The first wear is noticed on the straightening rolls. Not so much on the pins, which are highly resistant to wear, as in the grooves. Wear on the pins becomes first perceptible when the rolls tip. The grooves will be flattened in a very short time, as a result of stoppage of one or more straightening rolls. The wire will skid and be pinched at several points in its circumfer-

ence. A cleaning is now useless. Such cleaning must be immediate whenever a roll doesn't continue to turn. A straightening roll groove, damaged as a result of stoppage, is no longer round, but many-cornered as a result of flattening. The edges of such flattened rolls cause kinks in the nail shaft; it is then impossible to produce straight long nails of uniform grade. Flattened straightening rolls must have their grooves re-turned or be replaced by new rolls.

Wear in the Feed

The second place of wear in the chronological sequence is the feed-in. In first line is the bit holder. Here, with proper lubrication, wear commences later, but is not to be prevented after some running time. The same is true of the feed slide on which the bit holder is mounted. Here greater wear manifests itself in continually unequal lengths in spite of correct position and sharpness of the bit. Greater wear cannot be averted by subsequent adjustment of the slide bar in the slide track. By too great wear in the frame, which evidences itself through strongly curved feed of the wire between straightening rolls and gripping dies, in spite of correct diagonal position of the bit and slide, the slide track on the frame and even the slide itself must be levelled by welded coating.

The Heading Ram Action

The third point of wear, the heading hammer slide, is to be watched. According to the construction of the high-speed machine it may have shorter or longer slide. This is fixed throughout in place, the built-in fitting, or slip-plate, being commonly adjustable by means of back-pressure screws, as long as it is not too badly worn and a replacement is necessary. With too short a hammer slide and too short a radius link the slides, in consequence of the strong upsetting pressure, bend toward the rockers; the slide surfaces become worn as a result, both top and bottom. With increased wear this affects the nail heads; these set alternately eccentrically up and down, then again in between centrally on the shaft. The longer the hammer slide and ways, so much the more favorable, as the possibility of tilting is lessened. It is wise in making new purchases to make sure that this factor is taken care of by the construction.

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The author has ascertained, by dismantling old machines in order to make repairs, that with short hammer slides the lower and upper slide surfaces of the ways were strongly cambered and the hammer slides on the upper and lower slide surfaces likewise more or less. The slide, after the refitting, went snugly in the ways; the heads were, in spite of the change, eccentric to the shaft, while the heading ram rocked in the upsetting phase. Through refitting of the slip-plate the sidewise head displacement could be eliminated; not however, the up and down alternation. This is corrected only when the curved slide surfaces are again leveled and fitted close.

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With a longer heading hammer slide a refitting naturally cannot be avoided after a while, but must be done at longer intervals. Furthermore at most here an adjustment of the guide plates is sufficient, as the ever-present rocking tendency in head upsetting will not in this case so easily result in backward and forward surface wear.

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The consequence of greater heading hammer looseness has the tendency 1) to displace the nail heads and 2) toward all directions, already been mentioned, namely, the tendency (2 toward all directions) (1 to displace the nail heads) in spite of tight fitting of heading stamp and holder. The heading hammer will be moved back and forth by the crankshaft and connecting rod. Here wear occurs, which becomes noticeable solely through abnormally heavy blows, which can lead to breaks. The connecting rod bearing or the connecting rod pins in the heading hammer must then again be refitted.

The Gripping Die Lever

In the fourth place will come the gripping die lever. Here the lubricating point is half hidden and is easily overlooked and forgotten. As a consequence wear occurs here which is outside of the chronological and normal sequence. The roller reacts promptly to the forgotten lubrication and smokes. Then if the lubricant is applied, it is already too late. The roller has been eroded, or it indeed may freeze. With dismantling of the pressure lever as a result, or on account of too loose a pin, it is discovered that the pivot pin of the lever, upon which it moves, was insufficiently lubricated. On this account this pin is prematurely ground down. Good regular lubrication will delay wear. The same may be said of the roller.

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A consequence of the jamming is an unnecessary repair charge and lowered production; also, a premature wear of the eccentric. A groove forms on the contact surface of the latter part and therewith a displacement of the rim and trailing edge whereby retarded opening and premature closing of the dies occurs. As a consequence upsetting and buckling of the advancing wire happens, as is the case by advanced wear of the take-in mechanism, which always causes damage, and the wire must after every buckling be fed in anew.

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That is true if the pivot pin of the lever has worn too greatly. Lost motion results therefrom before the closing and opening of the dies narrows the opening; the upsetting is especially strong with new dies, with still sharp groove edges. The upsetting can be helped somewhat through introduction of larger lever throw, as long as the too great separation of the dies does not favor slipping of the wire and consequent flattening. Then nothing else will do but to make a new pivot pin or re-turn it and bush the die lever in order to eliminate the lost motion. Greater wear of the eccentric resulting from repeated jamming and accompanying blocking of the coil during the running of the machine can also lead to buckling of the wire in

spite of an undamaged pin; apart from the displacement of the opening and closing phase, the damaged eccentric is no longer adequate to effect a great enough opening. On no account should the coil run on the whole rotating surface of the eccentric; it should much more be free on the lowest part of the pitch in order to make possible regulation of the die opening in accordance with the wire diameter; and to increase the separation of the dies for heavy wire and to narrow it for fine wire, in order in the latter case to be able to correct a displacement of the wire out of the groove between the pressure surfaces of the dies. Too small an opening with heavy wire becomes evident in buckling.

Cutting or Pointing Dies

In the fifth and last place comes the knife holder, which in almost all types of machines is built as a slide carriage. By means of a locking cap the knife is firmly screwed in the recess provided for it. The wear on the knife carriage is insignificant, as the latter is case-hardened. Since the sliding surfaces are rather large, rocking of the knife holder is unlikely, and a taper gib makes possible a secure adjustment of a closed guide. Lubrication here should not be overlooked.

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If the guide is too slack, this will be evident in unequal cutting of the knife and heavier service thereon. It should be mentioned that the operator in such case should take immediate steps to prevent greater looseness of the guide to prevent premature wear of the knife carriage.

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The knife carriage will in general be forcibly actuated forward and back by means of a connecting rod, connected in movement with the knife carriage through a pin or disk head. Connecting rod bearing and pin or disk head also ten to wear, especially the bearing, the latter in increased degree if the pointing knives are too strongly pressed against each other, as is the case with poor wire or reduced resistance to cutting. The effects of this wear show themselves in greatly increased wear of knives, which an operator cannot readily explain when the machine appears to be in good repair. His commonest conjecture is 'poor wire'. Actually, however, with too great looseness the knives in idling following the running down of the spool are thrown against each other and the knife edges blunt each other, as in idling no resistance is present except for the small pressure surfaces on the front sides of the knives.

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To make the pressure surfaces somewhat greater is not advisable, because then the knives are more difficult to install and, in consequence of excess pressure, can tear; it is much more profitable to eliminate the looseness at the connecting rod bearing and when necessary at the pin or disk head. Still another effect follows too much looseness. Production of nails with the maximum length for which the type of machine is designed is now no longer possible. With slender sizes of the same length this is not the case, but with heavier wire it turns out that at full R.P.M. the stripper grips the nail and bears crookedly, because it is still held by the pointing knives. There is retardation of the opening through lost motion resulting from looseness, with deformed nails and rejects in consequence.

Effect of Worn Bevel Gears

Besides wear in the knife connecting rod bearing and disk head, worn teeth on the bevel gears of the main or transverse shaft can be the cause of retardation. This must be investigated. As already mentioned, in view of the high R.P.M., all operations of the high-speed machines must gear accurately in order to ensure a satisfactory run. This will be disturbed if any one or another phase is retarded. By wear on several machine elements dependent upon one another and geared together, retardation in the critical phase, in this case the opening of the knives, can be multiplied and cause serious difficulties.

With extreme wear of the teeth the bevel gears must be replaced; with still acceptable wear the transverse shaft can be moved forward in order to achieve an earlier opening. But it must be determined whether the take-in phase agrees with the pressing phase, as the pressure operation now opens and closes earlier, but the take-in however still perhaps pulls; the wire shows in consequence a more or less large bowing between intake and the heading dies. In this case the longitudinal adjustment head on the main shaft is set forward by means of the shifting key as much as necessary. One or two degrees will suffice. The bevel gears can then still run for a while, until too great wear of the teeth makes replacement inevitable.

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Accelerator or stripper need not especially be discussed. Damage to these is so clearly recognizable that it is remedied immediately when occasion rises, as deformed nails direct the operator's attention to difficulties.

Stamping Machines for Special Uses

With stamping machines, of which some are still found in every plant, for the fabrication of certain kinds of nails, hooks and the like, wear has less serious effects, as these machines operate with much slower R.P.M. and are less complicated in construction and operation.

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Here wear and looseness of the shear axes can be anticipated. If this is continued, displacement of the pointing knives, skewed points and heads result. If the displacement during the run involves vertical change, then severe wear of the shear axes or perhaps a loosened bearing cap must be inferred. If the displacement involves a horizontal change, however, it should at once be determined if the shear axes which carry the knife holders fit snugly with the adjusting sleeve, for wear or loosening of the limiting nuts make it possible for the shear axes to be displaced

(*Please turn to page* 1383)

Government Wire Production Information

Stockpiling Unit Reorganized

Franklin G. Floete, Administrator of General Services, announced on September 19th that the stockpiling unit of the General Services Administration has been reorganized and renamed the Defense Materials Service in accordance with the present character of its duties.

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Formerly known as the Emergency Procurement Service, the Defense Materials Service under the reorganization will continue to carry out stockpiling directives received from the Office of Defense Mobilization and will also handle other directly defense-connected activities assigned to GSA.

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The reason for the name change is that it more properly reflects the concentration of defense activities of GSA in a single service, and the fact that the maintenance and operation of the National Stockpile, including procurement of materials for it, will be a sustained activity for national defense rather than an emergency project. The former name reflected the emergency character of early stockpile buying when EPS was created. The stockpile today is a reserve of defense materials, valued at $6.5 billion, ready for use in a national emergency.

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The Defense Materials Service previously had jurisdiction for GSA over three principal functions: Stockpiling, expansion of domestic productive capacity of metals and minerals, and the production and sale of abaca, a fiber from tropical sources.

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To this is now added the administration of the National Industrial Equipment Reserve and the Defense Production Act Machine Tool Programs. Both of these were previously under the GSA Public Buildings Service.

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The Commissioner of the Defense Materials Service is **Elmer Weaver,** whose appointment as head of the Emergency Procurement Service was announced last June.

★ ★ ★

Mr. Weaver, a retired Vice President of the Union Oil Company of California, has served the Federal Government in various capacities since the beginning of World War II. He was Petroleum Consultant to the Conservation Division of the War Production Board in 1941 and 1942, Procurement Consultant to the Air Materiel Command of the Air Force at Wright Patterson Field, Dayton, Ohio, in 1951 and 1952, and Assistant Director for Materials of the Office of Defense Mobilization in Washington in 1953 and 1954.

MICROMETER PRECISION — MICRO-WELD — TRADE MARK REGISTERED

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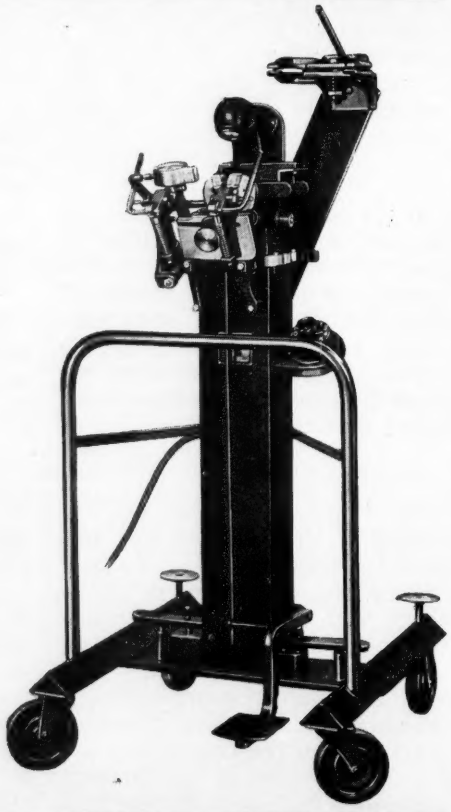
Standard equipment with these units include annealing dies, filing vise, light extension cord, and mounting on a 4-wheel truck. Special units can be furnished for crane mounting.



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LATENT DEFORMATION ENERGY IN DRAWN COPPER WIRES

K. Bohnenkamp, K. Luecke, G. Masing (Goettingen Univ). Zeits Metallkde 1955 Vol 46 pp 765-770; Chem Abstr 1956 Vol 50 (2) col 749 (Jan 25) (Original in German)

A NEW DRAWING DIE MEASURING MICROSCOPE. Ein neues Ziehstein-Messmikroskop

A. Metz. Draht 1956 Vol 7 (2) pp 39-40 (Feb) (In German)

Description of new Leitz instrument utilizing Perflektometer principle for determining both bearing length and angle of drawing cones. 7 illustr.

A CONTINUOUSLY MEASURING DEVICE FOR DETECTING UNIFORMITY OF FINE FILAMENTS SUCH AS OF TUNGSTEN

N. Naito, T. Ichikawa. Electrotechn Lab Bull 1954 Vol 18 (7) pp 501-506 (July); noted Jap Sci Rev: Mech & Electr Engg 1955 Vol 1 (2) p 168 (July)

ARMOUR PRODUCTS FOR WIRE DRAWING

Armour & Co Ltd. Wire Ind 1956 Vol 23 (271) p 606 (July)

Production of Armour chemicals by new chemical section of Hess Products Ltd. Chemicals are said to be cationic and soluble in oil, water or industrial solvents, and plate in form of monomolecular films on metals and solids. Good results claimed for Armowax dry lubricant and Duomeen TDO paste; sintered carbide die life increased from 24 to 144 hr on fine wire drawing.

THE EMBRITTLEMENT OF TUNGSTEN BY AMMONIA

G. L. Davis (Mullard Ltd). Metallurgia 1956 Vol 54 (321) pp 18-20 (July)

Contamination of atmosphere (90% nitrogen, 10% hydrogen) in which tungsten wires worked above 600 deg C, by ammonia, results in extreme embrittlement; reasons investigated. Effects of temp and time described. Embrittlement reversible and not observed in sections of wire electrolytically polished. Phenomenon probably due to high notch-sensitivity of tungsten, accelerated by relatively small surface contamination. 4 illustr, 11 ref.

STAINLESS STEEL WIREDRAWING THROUGH DIAMOND DIES

W. F. G. Kerley (Samuel Fox & Co Ltd). Wire & Wire Prods 1956 Vol 31 (6) pp 664-670, 711-712 (June)

Historical survey of employment of diamond dies and stainless steel. Description of typical modern wire-drawing mill; improved techniques most important in diamond die maintenance owing to new knowledge replacing traditional

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skills. Sources, types and physical properties of diamond summarized. Method of reinforcing diamonds for dies with metal surrounds; best undertaken prior to drilling owing to possibility of superficial burning of die bore. Examination of discarded diamonds recommended; repolishing of dies briefly described. Wear rate of dies in 9-die machine found to decrease with size of wire, ie largest die showed greatest wear reasons given. Microphotographs of crystal structure of wire before and after reduction compared. Theories of diamond polishing and wear processes summarized; importance of lubrication, hardness of wire and drawing stress emphasized. 11 illustr.

TITANIUM WIRE

Johnson & Funk Titanium Corp, Wooster, Ohio. Steel 1956 Vol 139 (1) p 92 (July 2)

Firm draws titanium, twice melted in vacuum, into wire from 0.03 to 0.25 in. dia.

CALCULATION OF TENSILE STRENGTH OF DRAWN STEEL WIRE. Rechnerische Ermittlung der Zugfestigkeit beim Ziehen von Stahldraht

O. Kowalski. Draht 1955 Vol 6 (8) pp 312-313; Osram Techn-Wiss Ber 1956 Vol 29 (6) p 191 (June 15) (In German)

Rules for nomogram for tensile strength of drawn wire as function of initial and final dia.

SIMPLEST METHOD FOR DETERMINATION OF PRODUCTIVITY IN WIRE DRAWING. Einfachste Methode zur Ermittlung der Produktion beim Drahtziehen

F. Liekmeier. Draht 1955 Vol 6 (9) p 371; Osram Techn-Wiss Ber 1956 Vol 29 (6) p 191 (June 15) (In German)

Development of formulae relating output in kg/hr to final dia, specific gravity, and drawing speed of wire.

INCREASED LIFE OF DIES THROUGH TREATMENT WITH COLLOIDAL GRAPHITE. Erhoehung der Standzeit von Gesenken durch Behandlung mit kolloidalem Graphit

F. Neuberger. Fertigungstechnik 1956 Vol 6 (7) pp 321-324 (July) (In German)

WIRE DRAWING MACHINE WITH DIFFERENTIAL BACK PULL. Drahtziehmaschine mit Differential-Gegenzug. Sachs. Draht 1955 Vol 6 (7) pp 276-277; Osram Techn-Wiss Ber 1956 Vol 29 (6) p 191 (June 15) (In German)

EXPERIMENTAL STUDY OF ELASTIC PULLING IN METALLIC WIRES

C. Salceanu, M. Zaganescu. Compt Rend 1956 Vol 242 p 2285; INSDOC List 1956 Vol 3 (13) col 776 (July 1) (Original in French)

THE THEORY OF PLASTIC DEFORMATION OF METALS. Die Theorie der plastischen Verformung von Metallen

G. A. Smirnow-Aljajew, W. M. Rosenberg. Sowjet Buchneuerschein 1956 (59) p 13 (No 85) (July 3) (In German)

Book, Mashgiz 1956, 320 pp. price DM 5.50.

BP 749,889. ETCHED FINE WIRES. Philips Electr Ind Ltd

Abstr Wire Prodn 1956 Vol 5 (8) p 23 (July).

See Bibl Ind Diamond Appl 1956 Vol 13 p B209 (Aug).

USP 2,750,311. PROCESS FOR DRAWING AND HEAT TREATING MAGNESIUM WIRE.

C. J. Snyder, W. G. MacLellan, Anaconda Wire & Cable Co. Light Met Bull 1956 Vol 18 (16) p 643 (Aug 3).

To increase ductility of magnesium wire during drawing reductions, it is heated to temp between 325 and 500 deg F (105 to 260 deg C) and held at this temp for initial reductions. Thereafter resulting wire is heated to lower temp between 275 and 100 deg F (135 and 40 deg C) and held there down to final reductions.

BP 720,018. METHOD OF PRODUCING STRANDED ELECTRICAL CONDUCTORS. Vereinigte Dtsch Metallwerke AG

Light Met Bull 1956 Vol 18 (16) p 609 (Aug 3).

Where conductors with extremely accurate cross-sections over entire length are required, slight loss of dimensional accuracy occurring in course of stranding percision drawn wire is corrected by subjecting individual wires composing stranded conductor to drawing operation in stranding head of stranding machine. For this purpose wires are passed through diamond dies disposed in stranding head.

Elevated-Temperature Properties of Coppers and Copper-Base Alloys

Another of a current series of reports prepared under the auspices of the Data and Publications Panel of the ASTM-ASME Joint Committee on the Effect of Temperature on the Properties of Metals, this report is primarily a graphical summary of the elevated temperature data for coppers and copper-base alloys. Data for the coppers are limited to the wrought materials, while the data for the alloys apply to cast and wrought materials.

★ ★ ★

Graphical data includes modulus of elasticity, tensile strength, yield strength, reduction of area, elongation, stress for creep rates of 0.000001, 0.00001, and 0.0001 per cent per hour and stresses for rupture in 100, 1000, 10,000, and 100,000 hr.

★ ★ ★

Included in the Appendix are data sheets giving the original data for drawing curves. Also included

THE 2 IN 1 WIRE
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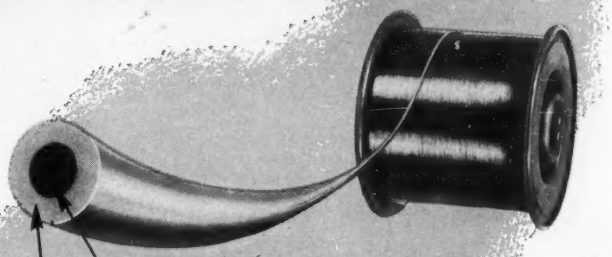

Electrical and Heat Conductivity of Copper plus Heat Resistance of Nickel

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are data sheets giving insufficient information for plotting or of such a nature as not to justify plotting, but meriting in 'usion on the basis of contributing to the limited information available on many of the coppers and copper-base alloys. The data sheets also give chemical composition shape, sizes and processing information.

★ ★ ★

The book was prepared for the panel by **Clair Upthegrove** and **Henry L. Burghoff.** Copies of this 248-page book are available from ASTM Headquarters, 1916 Race Street, Philadelphia 3, Pa. at $5.50 each.

Standards for Electrical Insulating Materials

This latest edition of the compilation of standards on electrical insulating materials, sponsored by Committee D-9 on Electrical Insulating Materials, includes specifications and test methods issued by the Society covering various types of materials in this field. The changes since the previous edition issued in 1955 comprise 12 revisions and 2 new items covering methods of testing silicone insulating varnishes and a recommended practice for cleaning plastic specimens for insulation resistance testing. Included are 83 methods of test and specifications.

★ ★ ★

There are also included two appendices, one giving proposed recommendations for writing statements on the usefulness of tests of electrical insulating materials and the other proposed methods of test for dielectric constant and dissipation factor of aviation fuels.

★ ★ ★

This publication gives the widely used specifications and test methods for the following materials used in the electrical and electronics industries:

Insulating Shellac and Varnish
Plates, Sheets, Tubes, Rods and Molded Materials
Mineral Oils for Electrical Insulation
Ceramic Products
Solid Filling and Treating Compounds
Insulating Fabrics and Papers
Mica Products

★ ★ ★

These standards—642 pages in

heavy paper covers—may be obtained from the **American Society for Testing Materials**, 1916 Race St., Philadelphia 3, Pa. Price, $6.00; to members, $4.50.

More Copper Planned

Roy C. Glover, Chairman of the Anaconda Company has announced that the company is planning to spend $350 millions in the next five years on the development of new copper mines in this country, which will increase U. S. production by 44%.

* * *

Mr. Glover sees a free world demand for copper of 4,600,000 tons a year by 1960. The expenditures are predicated upon the increasing need for additional copper, for which many low grade ore sources now can be profitably exploited.

New Steel Making Process Developed in England

A promising new process, still in an experimental laboratory stage, that may revolutionize methods of making steel in the future, has been announced by the **British Iron and Steel Research Association**.

* * *

In the conventional method iron ore, coke and limestone are charged into a blast furnace to produce pig iron, which is changed into steel in a Bessemer converter or an open hearth furnace.

* * *

The new process by-passes the pig iron step by converting finely powdered iron ore directly into steel. Fine droplets of liquid iron ore are blown through a gas (powdered coal and oxygen) to make a crude form of steel, dubbed "Cyclo - steel." Temperatures of 1600°C are involved, in which the ore reacts quickly, the flame passing out through a chimney and the steel settling out in a chamber.

* * *

It is somewhat similar to, but said to be more fundamental than the hydrogen iron process developed in the U. S., in which

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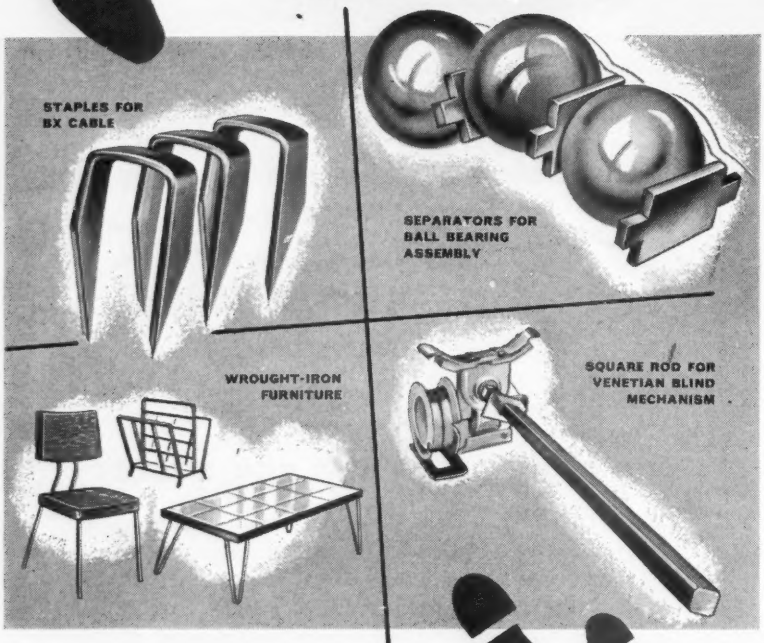
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• PRECISE MANUFACTURING CONTROL

Continental Special Shaped Wire is made under strict quality control to assure uniformity. You get a better product and fewer rejects—qualities that Continental wire customers especially appreciate. Let us help *you* save production steps, too. Write for the complete story of Continental wire today.

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powdered ore is reduced at a temperature near 500° C.

★ ★ ★

British scientists think it may take several years to design a full-scale plant, but believe that the process stands a good chance of becoming a commercial reality.

New Corrosion and Heat Resisting Nails

John Hassall, Inc., Westbury, N. Y., manufacturers of cold-headed products, is producing a new line of nails made from corrosion-resistant Hastelloy C. This alloy is capable of withstanding strong oxidizing conditions, such as those found with nitric acid, free chlorine, aqueous solutions containing chlorine or hypochlorites, acid solutions of ferric and cupric salts and other corrosive acids.

★ ★ ★

The nails were originally developed for use in fabricating and repairing wood vats containing strong corrosives that would attack other alloys. They are now used in atomic energy plants and paper mills and are expected to find additional usefulness in chemical plants, tanneries, pickling baths, fermentation processes, plating tanks, etc.

★ ★ ★

Stock sizes are 2½" x ⅛", 3½" x ⅛", 3½" x 5/16", 4½" x ⅛" and 4½" x 3/16", other sizes can be made to order.

Republic Steel to Have New Laboratory for Research

Work on detailed plans of the research laboratory of **Republic Steel Corporation** will be started soon **Peter Robertson,** Republic vice president in charge of planning and development announced.

★ ★ ★

The new site for the laboratory is on the east side of Route 21, just south of the village of Independence and nine miles from Cleveland.

★ ★ ★

The research center will consist of two buildings. One of these will house offices, meeting rooms, the

library, photographic, X-ray and analytical facilities. The other will house the principal laboratory facilities. The first of the two buildings has been designated as the "Research Center" and the second as the "Research and Development Laboratory."

★ ★ ★

"The center," said Mr. Robertson, "will enable Republic to bring together research groups which have been working in widely separated locations. Approximately 150 people will be employed, most of whom are presently with Republic in other locations."

Announcing a New Non-Destructive HiPot Tester

A new improved line of Sensitive HiPot Testers that automatically deenergize high voltage when leakage current in samples reach 10 microamps has been announced by **Peschel Electronics Inc.,** 17 Garden Street, New Rochelle, N. Y.

★ ★ ★

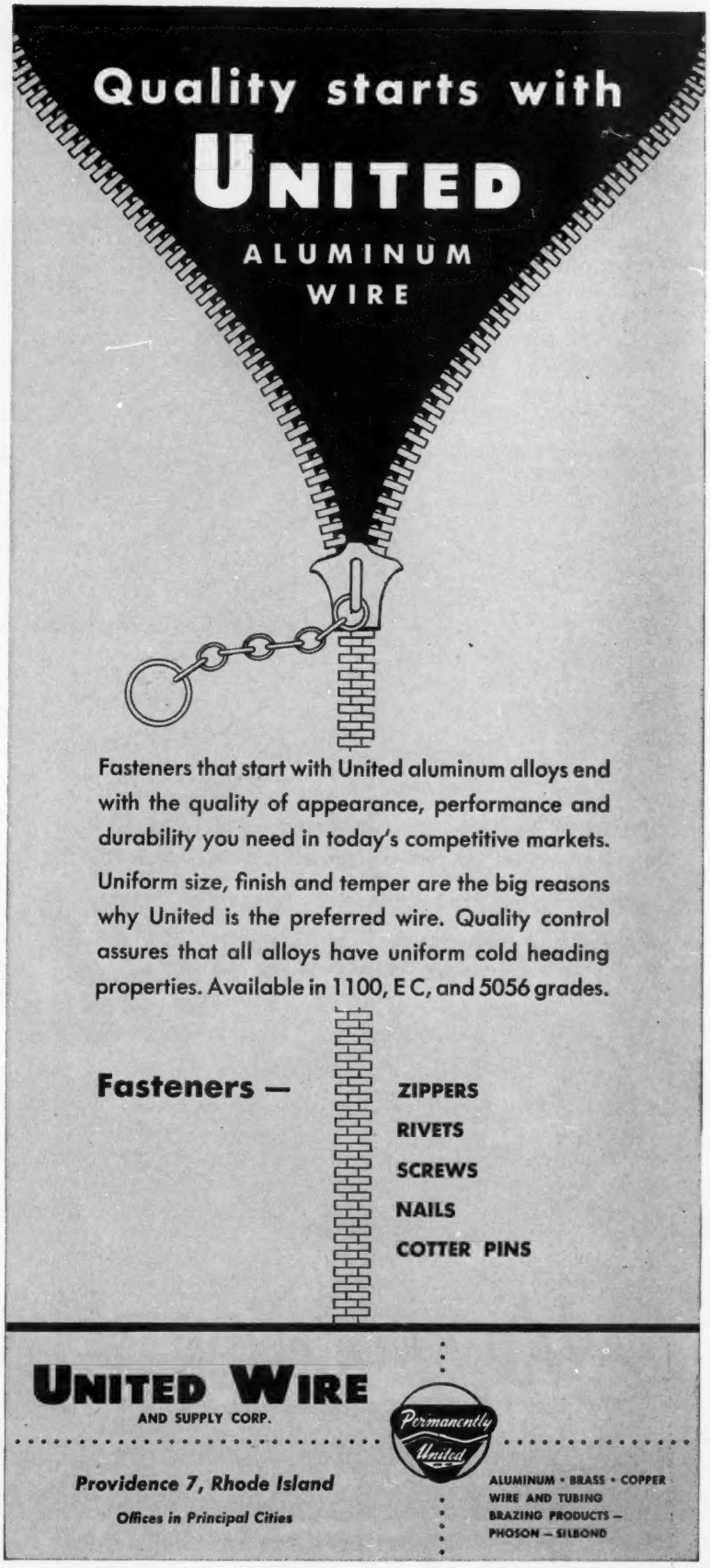
Models are available from 2 KV up to 120 KV and special units can be custom built. Smaller units are adjustable up to 1000 microamps and larger units up to 5000 microamps.

★ ★ ★

The new Series "H" tester avoids the brute force method of burning up fine equipment and components when testing for leakage. HiPot testing allows convenient and accurate dielectric testing of equipment, components and materials. With the new Series "H" tester, the high sensitivity shows up leakage currents in insulation which appear to be perfect on less sensitive instruments.

★ ★ ★

Standard features include both AC and DC outputs and continuously adjustable output voltage. Accurate hand calibrated dual scale metering, directly across the HV output, can be recalibrated at any time by a simple screw driver adjustment. A selfholding primary contractor prevents the accidental reapplication of high voltage after a line failure. The unit is complete with full safety controls and deadfront panel controls. Safety resistor in DC output lead.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BRAZING PRODUCTS —
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Outstanding Personalities of the Wire Industry

Becomes Officer of Stamford Processing Co.

On October 1, 1956, **Robert J. Royle,** joined his father, **Charles J. Royle,** as an officer of the **Stamford Processing Co., Inc.,** Peekskill, N. Y., manufacturers of metallizing wires and precision drawn fine wire. He will be vice president in charge of sales.

★ ★ ★

Mr. Royle will also represent **International Wire Products Corp.,** Midland Park, N. J., producers of stranded bare, tinned, silver plated wires and other specialties. In addition he will represent **The Bridgeport Insulated Wire Co.,** Bridgeport, Conn., in the sales of magnet wire, film insulated and textile served.

★ ★ ★

Educated at Fessenden, Hotchkiss and Yale, he served during World War II as a B-24 pilot on 40 combat missions in the Pacific with the 13th Air Force. In 1952 he served on loan from industry as a commodity analyst with the copper division, National Production Authority. For eight years he was associated with **Hudson Wire Company,** where he recently resigned as Sales Manager, Ossining Division.

Robert J. Royle

★ ★ ★

Becomes Member of WRI

Continental Steel Corporation, Kokomo, Ind., has been elected to membership in the Wire Reinforcement Institute, an association of manufacturers of steel welded wire fabric.

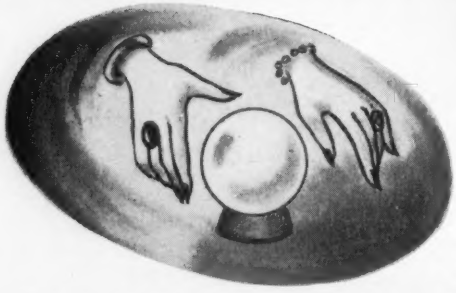
★ ★ ★

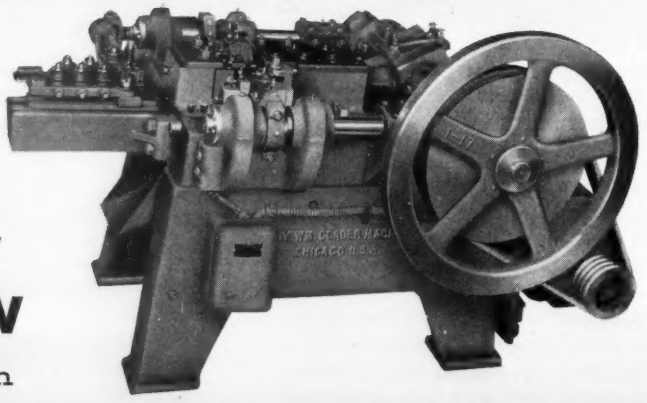
Under the leadership of Continental President **Edmond P. Severns** and Sales Vice President **Howard C. Williams,** the Indiana concern joins with other fabric manufacturers in the Institute's program of research, education and promotion of fabric-reinforcement for concrete work.

★ ★ ★

Continental traces its beginnings to 1896 when $6,000 capitalized a

IF THERE'S A NAIL MACHINE IN YOUR Future make it a GLADER





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small fence manufacturing company in Kokomo. Success of the new product and demands for other steel products resulted in a steady rapid expansion of the original facilities to the company's present important place in the steel industry.

Okonite's Hazard Division To Move Soon

A complete shutdown of operation at the Wilkes-Barre plant of **Hazard Insulated Wire Works** division of the **Okonite Company** will probably take place by the latter part of December.

★ ★ ★

In letters to employes over signature of **A. W. Robertson,** plant manager, the company offered job opportunities to employes of the local plant at the firm's new North Brunswick, N.J., plant.

★ ★ ★

Shutdown of the Hazard Insulated Wire Works division plant will be gradual. Movement of some machines will be effected latter part of October. The rest of the machinery will be moved out in December.

Made Officer of La Salle Steel

Thomas A. Kelly has been elected to the position of Executive Vice President of **La Salle Steel Co.,** Hammond, Ind.

★ ★ ★

Announcement of this advancement was made by **T. L. Kelly,** President, following a meeting of the Board of Directors.

★ ★ ★

Mr. Kelly is a graduate of Phillips Academy, Andover, Mass., Yale University Class of '43 and an alumnus of the University of Chicago Executive Program.

★ ★ ★

Prior to this new assignment Mr Kelly was Vice President and Treasurer. He has had a broad background in the cold finished steel bar business and is well qualified for his new duties.

Chase Brass Promotes Strong

The board of directors of **Chase Brass & Copper Co. Inc.,** a subsidiary of **Kennecott Copper Corp.** has elected **Frank P. Strong** assistant treasurer. Mr. Strong was born in Woodbury and was graduated from Dartmouth College, Tuck School of Business Administration, with an A.B. degree.

★ ★ ★

He came to Chase in November, 1927, as assistant to the head of the cashier's department. In January, 1929, he was promoted to general accountant in charge of the sales and warehouse division, a position which he held until May, 1940, when he was made administrative assistant to the treasurer, becoming chief accountant in May, 1946, the position he has held until his election as an assistant treasurer.

NORBIDE* Abrasive Grain...

Ready to cut Your Refinishing Costs!

Wire men who have switched from costly diamond dust to NORBIDE Abrasive for refinishing dies are amazed at the savings. They have found NORBIDE Abrasive — the hardest manufactured abrasive commercially available—ideal for ripping and semi-finishing operations. Whatever your requirements, we can supply you promptly from stock.

For details and prices on this cost-cutting abrasive, write for form 559, NORTON COMPANY, 45 New Bond St., Worcester 6, Mass.

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NORBIDE* | *The hardest manufactured abrasive commercially available!*

Armco Announces Executive Changes

R. L. Gray, president of **Armco Steel Corp.,** announced several major changes in general management.

★ ★ ★

The company's steelmaking operations are now being carried on by the Armco Division, under the management of **R. S. Gruver,** administrative vice president; and the Sheffield Division under **L. H. Juengling,** who was elected vice president to succeed **J. W. Anderson,** who is retiring.

★ ★ ★

Products will be distributed by **L. T. Johnston,** vice president in charge of distribution. **W. S. Newell** will serve as general manager of sales of the Sheffield Division and **W. B. Quail** will continue as general manager of sales of the Armco Division.

★ ★ ★

Vice President F. H. Fanning will take charge of the new division for planning and development. All other company-wide staff divisions will continue to operate as in the past.

★ ★ ★

Mr. Gray also announced the retirement of **L. F. Reinartz,** vice president in charge of special operating development, and **F. C. Herbster,** manager of the Kansas City plant. **R. F. Kuhnlein,** assistant manager of the Kansas City plant, will succeed Mr. Herbster.

★ ★ ★

C. G. Davies, who has been administrative assistant in the Armco Division, has been appointed assistant vice president.

Won't You

Give A Paper In 1957

AT AN ASSOCIATION MEETING?

Papers on Wire, Rod, Wire Product and Electric Wire and Cable subjects can be used at the technical sessions of the several coming meetings of THE WIRE ASSOCIATION.

You are cordially invited to volunteer your services and a subject. These will be turned over to the respective chairmen of the meetings, who will confirm arrangements with you direct.

Your cooperation will help to keep our industry vital, strong, progressive and prosperous.

Please write to

RICHARD E. BROWN, *Executive Secretary*

THE WIRE ASSOCIATION

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Joins Inco's Bayonne Research Laboratory

Dr. Gordon E. Zima has joined the staff of the Bayonne Research Laboratory of **The International Nickel Co., Inc.,** as a research metallurgist, **Dr. W. A. Wesley,** Manager of the Laboratory, has announced. Dr. Zima will work in the field of high temperature metallurgy, including research on the physical chemistry of the process of preparing alloys by melting under a high vacuum. He is a graduate of the California Institute of Technology, where he received his Doctorate of Philosophy (mechanical engineering and chemistry) and the degree of Master of Science (mechanical engineering), and of Stanford University, where he obtained the degree of Bachelor of Arts (chemistry).

Joins Inco's Field Section

Alden P. Edson has joined the staff of the New England Technical Field Section of the **International Nickel Company's** Development and Research Division, according to an announcement by **Donald J. Reese,** Assistant Manager of the division. He holds a degree of B.S. in Chemical Engineering from the University of Kansas.

★ ★ ★

Formerly associated with INCO as a metallurgist at the Research Laboratory at Bayonne, N. J., Mr. Edson from 1943 until this year was with Hamilton Standard Division of United Aircraft Corp., at Windsor Locks, Conn. Starting as a senior metallurgist, he served subsequently as assistant chief metallurgist, chief metallurgist and chief materials engineer.

Chase Brass Appoints Treasurer

Announcement of the designation of **Robert C. Smith,** assistant treasurer of **Chase Brass & Copper Co.,** a subsidiary of **Kennecott Copper Corp.,** to the office of treasurer was made in August by President **Richard C. Diehl.** He replaces **John H. Gilbert,** who retired September 1st.

★ ★ ★

Mr. Smith was born in Princeton, Ill., and was graduated from Bradley University with a B.S. degree in 1928 and from the Harvard Business School in 1933.

NOPCO Expands Product Research

In line with the expanding research program being carried on by the **Nopco Chemical Company, Dr. John E. Ward** has been named to a newly created research post in the company. He will be responsible for the development of product research programs with established goals for all of Nopco's Industrial Divisions. The ultimate goal will be new and improved industrial processing chemicals for industry.

To Direct New Pennsalt Operations in Mexico

Robert P. Ogden has been appointed general manager of the **Industrial Quimica Pennsalt S. A. de C. V.,** a new subsidiary of **Penn-Salt International Corp.** in Mexico. In announcing the appointment, PIC President **Richard L. Davies** stated that this component already has a new plant under construction near Mexico City for the production of chlorine, caustic soda, muriatic acid, hydrogen and other chemical products.

Mr. Ogden joined the company after receiving a degree in chemical engineering at Cornell University in 1941. At the time of his appointment, he was manager of Pennsalt's plant at Riverview, Michigan.

★ ★ ★

Other Pennsalt International affiliates in Mexico are Pennsalt de Mexico with plants in Mexico City and Navojoa and Minerales y Metales Industriales which operates Mexico's largest fluorspar mine near San Luis Potosi. The company also has interests in Brazil, Peru and Venezuela.

To Direct Marketing for Polymer Chemicals

The appointment of **Willard deCamp Crater, Jr.** as Marketing Director of the **Polymer Chemicals Div.** of **W. R. Grace & Co.,** has been announced by **T. T. Miller,** division president.

★ ★ ★

Mr. Crater comes to Grace from

Use HEANIUM
NO 88007
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.2756 I.D
NEW DEPARTURE BALL BEARING No 88007
INSERTED IN NYLON
PULLEYS ARE AVAILABLE IN VARIOUS SIZES AND WITH BEARINGS OR BUSHINGS AS SPECIFIED
the NEW material that withstands hi-speed pressure of wire by the tons
If guide wear is a problem in your mill . . .
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IS THE BEST GUIDE TO LOW COSTS.
HEANY INDUSTRIAL CERAMICS CORP.
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The Naugatuck Chemical Div. of U.S. Rubber, where he was Manager of Marvibond Sales. With Naugatuck since 1950, he served also as Manager of Vinyl Sales and Assistant Manager of Plastics Sales. Prior to that he had been with the Glenn L. Martin Co., Federal Telephone and Radio Corp., and Hercules Powder Co. He holds several patents and has published several papers on plastics.

★ ★ ★

He received his education at the University of Delaware and at Rutgers University. He is Chairman of the Thermoplastic Structures Division of the Society of the Plastics Industry, and liaison member for SPI on the Chemical Industries Advisory Board, is a past president of the Baltimore-Washington chapter of the Society of Plastics Engineers, is a member of The Wire Association and in the New York Rubber Group of the American Chemical Society.

Research Engineer Joins G.E.

Norman A. Matthews, formerly assistant chief metallurgist, materials research and development unit of American Brake Shoe Co., Mahwah, N. J., has joined **General Electric's Metallurgical Products Dept.,** Detroit, as a research engineer in connection with advance development to do research work in the field of special inorganic materials.

★ ★ ★

He is a graduate of Massachusetts Institute of Technology. During his Army (ordinance) service in World War II, he was stationed in the ferrous metallurgical laboratory of Watertown Arsenal. While at Watertown he became chief of the metallurgical engineering branch and later director of the laboratory.

Made Market Manager by G.E.

George M. Hartley, for the past 4 years sales manager of General Electric's Chemical Materials Department, Schenectady, N. Y., has been appointed manager of marketing for the company's Metallurgical Products Department, Detroit, **K. R. Beardslee,** general manager announced. He succeeds **J. E. Weldy,** who recently was appointed a marketing consultant for the company's Marketing Services Division, New York.

Sales Manager Appointed by Loewy-Hydropress

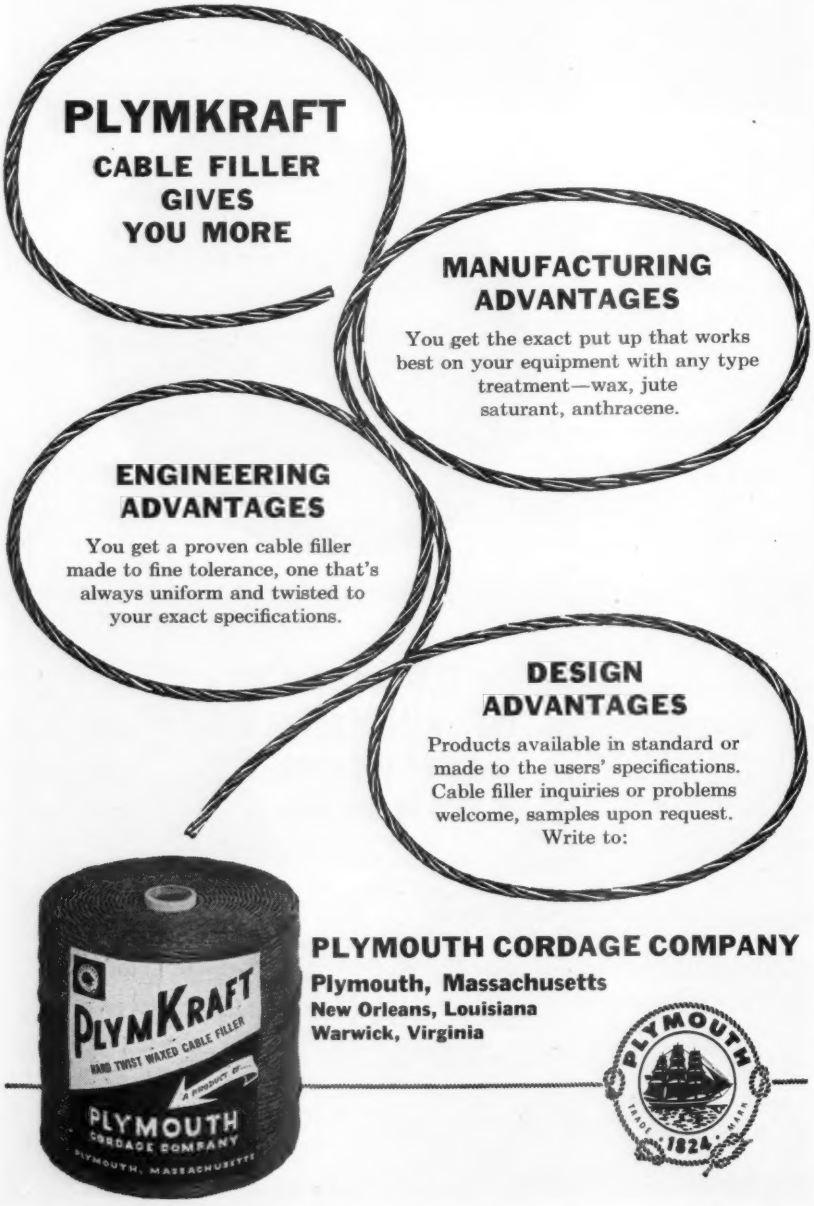
Loewy-Hydropress Division of **Baldwin-Lima-Hamilton** announces the appointment of **Frederick A. Fielder** as their General Sales Manager.

★ ★ ★

Mr. Fielder has twenty years of experience in the hot and cold working of ferrous and non-ferrous metals, machinery, building and ordnance. He has, for several years, been Loewy - Hydropress Project and Procurement Coordinator for the United States Heavy Press Program and was recently appointed Assistant to the General Manager.

Goetze to Head Western Electric

At a special meeting of the Board of Directors on September 26, 1956, **Arthur B. Goetze** was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elected president of the **Western Electric Company,** succeeding **Fred R. Kappel,** who last week was elected president of the **American Telephone and Telegraph Company.**

★ ★ ★

Mr. Goetze has been a vice president of the Company since 1952 and a director since 1953. He is succeeded by **Paul A. Gorman,** who has been vice president-finance. At the same meeting the Board elected **Paul R. Brousse** a vice president. Mr. Brousse who for the past year has been comptroller of the Company's manufacturing division, will replace Mr. Gorman as vice president-finance.

G. E. Promotes Coplan

Appointment of **Burton V. Coplan** to the post of Silicon Project supervisor at **General Electric Company's** Chemical Development Department, has been announced by Process Development section manager **George E. McCullough.**

★ ★ ★

Mr. Coplan is a graduate of Rensselaer Polytechnic Institute, where he received both his B.S. and M.S. degrees in Chemical Engineering. Prior to coming with General Electric in 1948 he worked as a process design engineer for the **M. W. Kellogg Co.**

Named General Manager of Barnes-Gibson-Raymond Divisions

Charles J. Stofko has been appointed general manager of the **Barnes-Gibson-Raymond** divisions of **Associated Spring Corp.** at Plymouth and Ann Arbor, Mich., effective September 4th, according to an announcement by **Carlyle F. Barnes,** president of Associated Spring. He succeeds **N. Markham Purple,** who has resigned because of ill health.

★ ★ ★

Mr. Stofko went to work for the **Wallace Barnes Co.,** the Bristol division of Associated Spring, in 1929, after graduating from the local high school. He worked his way up through a progression of managerial duties in several departments, and became factory manager in 1953.

★ ★ ★

To assume Mr. Stofko's responsibilities in Bristol, **G. Theodore Zahnke,** general manager of the Corporation's Bristol divisions, has appointed **Stanley M. Rimmer** as spring works manager and **David L. McAllister** as steel works manager. Both men have had long experience in their respective fields of manufacturing at the Wallace Barnes Company.

Kennametal Adds to Research Staff

John Wambold has joined the research staff of **Kennametal, Inc.,** Latrobe, Pa., as a metallurgical engineer, according to an announcement by **J. C. Redmond,** vice president of research. For the last six years, Mr. Wambold was associated in a similar capacity with the Curtiss-Wright Corporation at its Wright Aeronautical division.

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MASON CAN COMPANY
1949 Dexter Road, E. Providence 14, R. I.
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Field Sales Manager Appointed by Macwhyte

Macwhyte Company, manufacturers of wire rope at Kenosha, Wis., have announced that effective immediately, **Russell J. Whyte** has been appointed Field Sales Manager for the company.

★ ★ ★

For the past twelve years he has been a District Factory Representative in California and prior to this was employed by Macwhyte in product engineering work. He has 21 years of service with the company. He attended Cornell and the University of Illinois and graduated from Illinois in General Administrative Engineering

Made Executive VP by Atlantic Steel

Harold B. Johnson has been elected executive vice president of **Atlantic Steel Company**, Atlanta. This announcement was made by company president **R. S. Lynch**, following a regular meeting of the board of directors. Mr. Johnson had held the position of vice president in charge of sales and finance since 1949, and has been a member of the board of directors since 1950.

★ ★ ★

Born in Tallapoosa, Ga., Mr. Johnson came to Atlanta to enroll in the Georgia Institute of Technology. He graduated from there in 1934.

★ ★ ★

In 1933, he joined Atlantic Steel, starting in the accounting department. Advancements followed to cost accountant, chief schedule engineer and other department manager. He was assistant secretary in 1945, and vice president, finance and accounting the following year.

To Cover Massachusetts for Fastener Firm

Clark Bros. Bolt Co., Milldale, Conn., manufacturers of bolts, nuts, rivets, screws and special industrial fasteners, has announced that **Fred C. Brown** has had Massachusetts added to the territory he covers. He has been serving N. Y., N. J. and Pa.

★ ★ ★

The move is part of a revision of territories made recently to provide improved services to industrial distributors, manufacturing concerns and hardware wholesalers.

ALUMINUM STATISTICS

PRIMARY ALUMINUM PRODUCTION IN THE UNITED STATES
(in pounds)

1956	
August	184,812,424 **
July	303,248,010
Total for the year through August	2,208,668,213
1955	
August	267,081,664 *
Total for the year through August	2,052,151,837 *
All-time record month	
July 1956	303,248,010
All-time record quarter	
2nd 1956	882,505,193

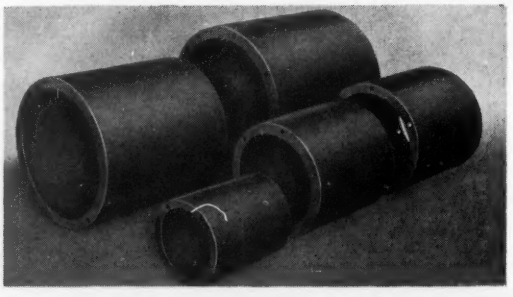
* Revised from previous reports.

** Reflects loss of production due to strikes.

September 21, 1956

STEEL TRAVERSES FLANGED STEEL DRUMS FOR REELS for WIRE • CABLE • WIRE ROPE

Plain, Painted or Hot-Dip Galvanized Finishes



Left: Assembly of flanges and drums.
Above: Hubbard Steel Traverses (drums).

Made for use with nailed, plywood, metal bound and cast flanges.
Furnished in steel—with plain or flanged ends. Easy to assemble and repair.

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AIS 10

Total Number of Companies Included 131

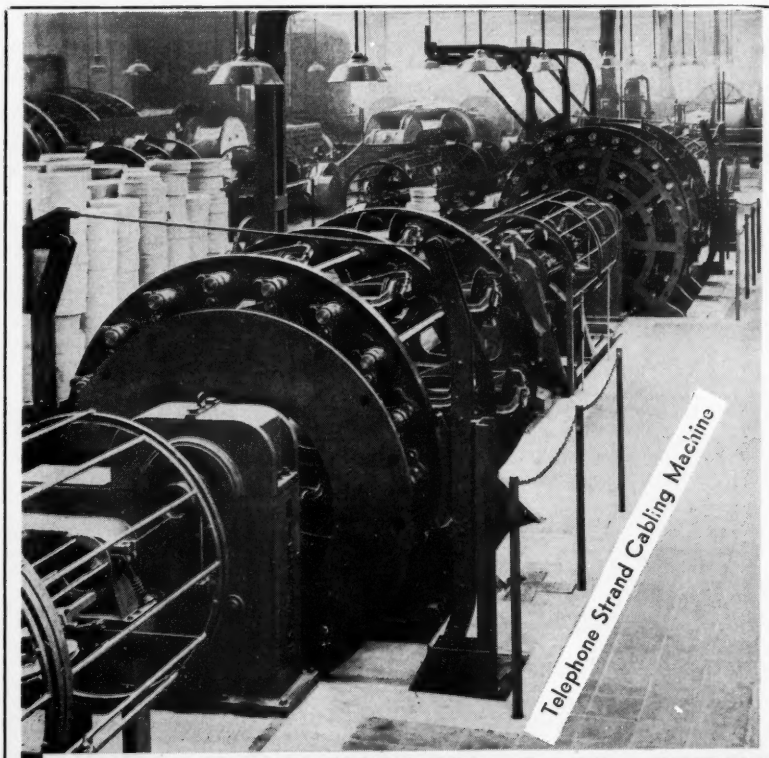
JULY AND AUGUST - 1956
Month

SHIPMENTS OF STEEL PRODUCTS
ALL GRADES INCLUDING CARBON, ALLOY AND STAINLESS
(Net Tons)

Covering Net Shipments (Excluding Shipments to Members of the Industry for Conversion into Further Finished Products or for Resale)

Steel Products	Items	CURRENT MONTHS JULY AND AUG. 1956 Carbon	Alloy	Stainless	Total	Percent of Total Shipments	YEAR TO DATE (R) 1956 Carbon	Alloy	Stainless	Total	Percent of Total Shipments	Prior Year (1955) Percent of Total Shipments
Ingots and Steel Castings	1A	33,663	20,369	1,733	55,765	0.8	323,037	120,857	16,486	460,380	0.8	0.7
Blooms, slabs, billets, sheet bars	1B	114,994	45,805	2,012	162,811	2.4	1,100,381	366,211	19,423	1,486,015	2.8	3.3
Tube rounds	1C	240	362	-	602	-	8,408	2,105	89	10,602	-	-
Skelp	2	12,051	-	-	12,051	0.2	113,324	-	-	113,324	0.2	0.2
Wire rods	3	58,671	920	265	59,856	0.9	677,901	13,963	3,009	694,873	1.3	1.4
TOTAL SEMI-FINISHED		219,619	67,456	4,010	291,085	4.3	2,223,051	503,136	39,007	2,765,194	5.1	5.6
Bars—Hot rolled (incl. light shapes)	14	508,650	129,470	7,343	645,463	9.5	4,354,660	1,232,989	40,582	5,628,231	10.4	10.2
Bars—Reinforcing	15	237,614	-	-	237,614	3.5	1,544,621	-	-	1,544,621	2.9	2.5
Bars—Cold finished	16	121,912	24,345	5,905	152,162	2.2	956,143	196,509	38,968	1,191,620	2.2	2.2
Tool steel	17	2,004	14,390	-	16,394	0.2	12,017	75,072	-	87,089	0.2	0.2
TOTAL BARS AND TOOL STEEL		870,180	168,205	13,248	1,051,633	15.4	6,867,441	1,504,570	79,550	8,451,561	15.7	15.1
Wire—Drawn	23	244,037	4,517	2,245	250,799	3.7	1,940,048	33,748	20,594	1,994,390	3.7	3.8
Wire—Nails & staples	24	53,969	-	-	53,969	0.8	385,827	-	1	385,828	0.7	0.8
Wire—Barbed & twisted	25	5,205	-	-	5,205	0.1	60,494	-	1	60,495	0.1	0.2
Wire—Woven wire fence	26	24,009	-	-	24,009	0.3	208,838	-	-	208,838	0.4	0.4
Wire—Bale ties	27	4,620	-	-	4,620	0.1	41,817	-	-	41,817	0.1	0.1
TOTAL WIRE & WIRE PRODUCTS		331,840	4,517	2,245	338,602	5.0	2,637,024	33,748	20,596	2,691,368	5.0	5.3
TOTAL SHIPMENTS (1956) July & August		6,331,668	427,398	69,837	6,828,903	100.0	49,711,661	3,674,695	435,169	53,821,525	100.0	xxx
TOTAL SHIPMENTS (1956) July		1,172,890	93,305	22,793	1,288,988	xxx	44,502,669	3,331,957	388,148	48,222,774	xxx	xxx
TOTAL SHIPMENTS (1956 August		5,158,778	334,093	47,044	5,539,915	xxx	49,711,661	3,674,695	435,169	53,821,525	xxx	100.0

(R) Revised



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WIRE STRANDING
ROPE CLOSING
CABLE MAKING

MACHINES

Cabling machines for steel, copper and aluminum wires, rubber and telephone strands

MASCHINENFABRIK K. A. NIEHAUS • GERMANY
DÜSSELDORF-RATH

Refined metals consumed in mill products 1/ in 1955 and in 1956, by months, and stocks of refined copper at end of period, gross weight in short tons

Period	Consumption						Stocks of refined copper	
	Wire mills	Brass mills						
	Refined copper 2/	Refined copper 2/	Refined lead	Primary pig tin	Refined nickel	Slab zinc	Wire mills	Brass mills
1955 3/	812,663	647,044	3,443	1,055	3,527	133,737	21,387	41,518
1956:								
January	77,293	65,519	300	135	368	12,203	18,102	33,173
February	71,838	63,703	345	138	411	11,680	18,900	34,268
March	82,678	60,542	329	128	368	11,884	17,875	40,272
April	81,871	60,035	291	112	366	11,800	20,737	42,233
May	82,270	58,625	246	95	342	11,381	23,586	45,274
June	79,013	44,110	177	67	403	7,475	28,480	51,566
July	45,301	31,771	115	56	319	4,578	51,686	58,738
August	71,183	48,529	203	(4)	(4)	7,694	51,850	49,503

1/ Data cover operations of 17 wire mills and 57 brass mills.
2/ Detailed information on consumption of refined copper is published in the Monthly Copper Report.
3/ Final figures.
4/ Not available.

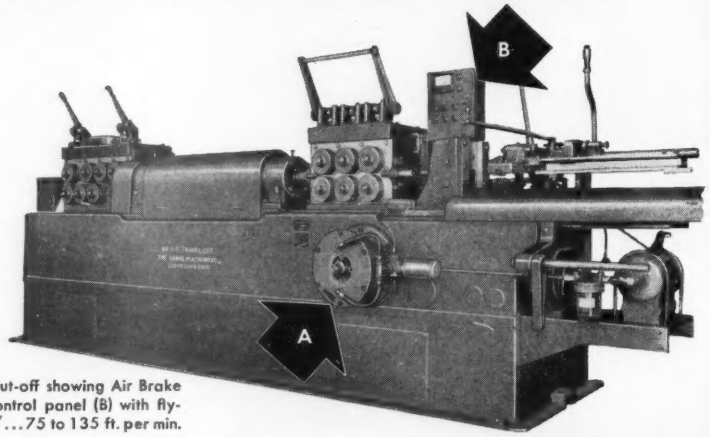
NON-FERROUS METAL STATISTICS

SUPERIOR QUALITY CONTROL!

WITH LEWIS TRAVEL-CUT WIRE STRAIGHTENING AND CUTTING MACHINES EQUIPPED WITH AIR CLUTCH, AIR BRAKE AND VARIABLE SPEED DRIVE

Lewis engineers have added three important improvements to their famous Travel-Cut Wire Straightening and Cutting Machines, 1. Wichita Air Clutch, 2. Wichita Air Brake, 3. Reeves Motodrive or similar variable speed drive, for SUPERIOR QUALITY CONTROL. Assures greater accuracy and produces quality rod with a minimum of spot swell. Lewis Machines are available in 34 models to handle from .012" to ¾" dia. at speeds up to 200 FPM.

NEW BROCHURE ON REQUEST



No. 11-F Travel-Cut with Flying Shear Cut-off showing Air Brake (A) (guard removed) and push-button control panel (B) with flywheel speed tachometer. Cap. ½" to ¾"...75 to 135 ft. per min.

THE LEWIS MACHINE COMPANY 3440 EAST 76th STREET CLEVELAND 27, OHIO

A Review of Recent Wire Patents

The data listed below is only a brief review of recent patents pertinent to the readers and subscribers of this publication.

Complete copies of these patents may be obtained by writing to the publisher of this magazine and remitting 50c for each copy desired. For orders received from outside the United States the cost will be $1.00 per copy.

No. 2,761,156, AUTOMATIC SCREW SLOTTING ATTACHMENT FOR TURRET LATHES, patented September 4, 1956 by Caleb C. Halling, Angelica, New York.

A screw-severing and head-slotting attachment for screw-forming turret lathes is disclosed and adapted to be mounted upon the cross feed support of the lathe, with a bracket engageable in the turret thereof and carrying a shank receiving device.

★ ★ ★

No. 2,761,157, DIE-OPERATING MEANS FOR DUPLEX HEAD NAIL MACHINES, patented September 4, 1956 by Clarence E. Chism, Pittsburg, Calif.

Retracting mechanism is claimed for operation of a set of longitudinally-movable dies pivoted on die holders for cooperation with a set of longitudinally-fixed dies.

★ ★ ★

No. 2,761,457, HAIR RETAINER, patented September 4, 1956 by Robert C. Wood, Youngstown, Ohio, assignor to Promo Corporation, New York, N. Y., a corporation of New York.

The device comprises a number of side-by-side combined units formed of resilient wire strands.

★ ★ ★

No. 2,761,629, COIL WINDING MACHINE, patented September 4, 1956 by Otto Jakob Wirth, Zurich, Switzerland, assignor to Micafil A. G., Zurich-Alstetten, Switzerland.

More specifically, the machine is for winding wire upon closed ring cores. There are ten claims.

★ ★ ★

No. 2,761,630, COIL WINDING APPARATUS WITH INTEGRAL TENSION MEANS, patented September 4, 1956 by Howard A. George, Oyster Bay, N. Y.

A tensioning mechanism is disclosed responsive to wire tension through operation of a tension adjuster of special form.

★ ★ ★

No. 2,761,893, TRAVELING ELECTRICAL CABLE, patented September 4, 1956 by James J. Morrison, Worcester, Mass., assignor to United States Steel Corporation, a corporation of New Jersey.

The cable comprises a number of steel supporting strands of steel wires, a covering of fibrous material, a center filler around which the strands are stranded with a lay opposite to the lay of the wires, a filler in the valleys between the strands, a covering of fibrous material over the assembled strands, a number of conductors of No. 16 AWG or coarser stranded about the covered assembled strands, each of the conductors including a number of annealed copper wires bunched together with a lay of the same direction as the conductors and a synthetic resin insulation surrounding each of the conductors, the transverse area of each conductor being between 30% and 50% of the transverse area of conductor plus the surrounding insulation.

★ ★ ★

No. 2,762,064, BURR REMOVER FOR SCREW-SLOTTING MACHINES, patented September 11, 1956 by Erwin B. Byann, Wolcott, and Anthony K. Undraitis, Waterbury, Conn., assignors to The Waterbury Farrel Foundry & Machine Company, Waterbury, Conn., a corporation of Connecticut.

A cutter is adapted to move into and out of the path of the heads of screw blanks, which are carried by the peripheral portion of a rotatably mounted dial, for removing burrs from the heads.

INTERNATIONAL *Fine Wire Co., Inc.*

Precision Wire Drawn to Your Specifications

SILVER PLATED COPPER WIRE

Concentric Stranded Bunched & Single End. 1¼-1½ to 4% Silver Coated on Copper by weight. Amount of Silver accurately controlled for thickness and purity to meet U. S. Government specifications.

Constructions supplied to your special design.

WE ALSO SUPPLY:

NICKEL • NICKEL PLATED WIRE • RESISTANCE WIRES • MONEL • COPPER AND ALL TYPES OF STAINLESS STEELS—BOTH SINGLE END AND STRANDED FORMS

In Special Tempers, Annealed, Bunched and Stranded, etc.

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Telephone: Gilbert 4-2151

No. 2,762,065, SEPARATE LEVER OPERATED MEANS FOR OPENING AND CLOSING THE CHASERS ON A DIE HEAD, patented September 11, 1956 by Charles C. Krieger, Chicago, Ill., assignor of one-half to Marie M. Krieger, Chicago, Ill.

Means is provided for urging locking fingers, carried by thread-cutting die holder levers, toward a lock whereby they are automatically movable into interlocking engagement with the lock when the levers are moved so as to close a pair of thread cutting dies with the result that the dies are thereby locked in closed position.

★ ★ ★

No. 2,762,102, CLOTHESPIN, patented September 11, 1956 by Bernard Johnson, Milwaukee, Wisconsin.

The clothespin is formed of a single length of bent wire.

★ ★ ★

No. 2,762,103, HOOK FOR GARMENT HANGERS, patented September 11, 1956 by Smoe O. Hulett, Spring Creek, Pa.

A hook is disclosed for suspending a garment hanger from an overhead support and comprising a single length of wire.

★ ★ ★

No. 2,762,763, PROCESS AND APPARATUS FOR SIMULTANEOUSLY DRAWING AND PLATING WIRE, patented September 11, 1956 by Herbert Kenmore and Walter J. Manson, Jersey City, N. J., assignors, by mesne assignments to National Standard Company, Niles, Mich., a corporation of Delaware.

The tensioned wire is electroplated while being continuously vibrated at the natural vibration frequency of the wire as determined by the length and high tension of drawing.

★ ★ ★

No. 2,763,296, MACHINE FOR JOINING WIRE PORTIONS OF SPRINGS PARTICULARLY THOSE OF GENERALLY HELICOIDAL SHAPE USED IN BOX MATTRESSES, SEAT CUSHIONS AND LIKE FURNITURE APPLIANCES, patented September 18, 1956 by Robert Lecoq, Paris, France.

The wire portions are twisted together and a fastening wire applied.

★ ★ ★

No. 2,763,878, METHOD OF AND APPARATUS FOR MAKING CUT NAILS, patented September 25, 1956 by Evan E. Hemann, Mead Township, Belmont County, Ohio.

A machine is disclosed for the manufacture of the nails from continuous strip material. There are twelve claims.

★ ★ ★

No. 2,763,979, CABLE TWISTING, WRAPPING, AND REELING MECHANISM, patented September 25, 1956 by Victor T. Swanson, New Haven, Conn., assignor, by mesne assignments, to Wire Machinery Corporation of America Incorporated, New Haven, Conn., a corporation of Connecticut.

The machine includes a pair of spaced-apart rotating cradles with a capstan carried by one to draw in the wire to be twisted and a reeling mechanism carried by the other cradle, each cradle being provided with hollow trunnions whereby the cable formed in the first may pass therethrough to the reeling mechanism in the second, and wrapping means located between the cradles to wrap an element about the cable as it passes from one cradle to the other.

★ ★ ★

No. 2,764,226, SPRING ASSEMBLY AND UNITS EMPLOYED IN THE MANUFACTURE OF SAME, patented September 25, 1956 by Fred A. Nachman, Jr., Chicago, and Louis F. Hosek, Berwyn, Ill., assignors to Nachman Corporation, Chicago, Ill., a corporation of Illinois.

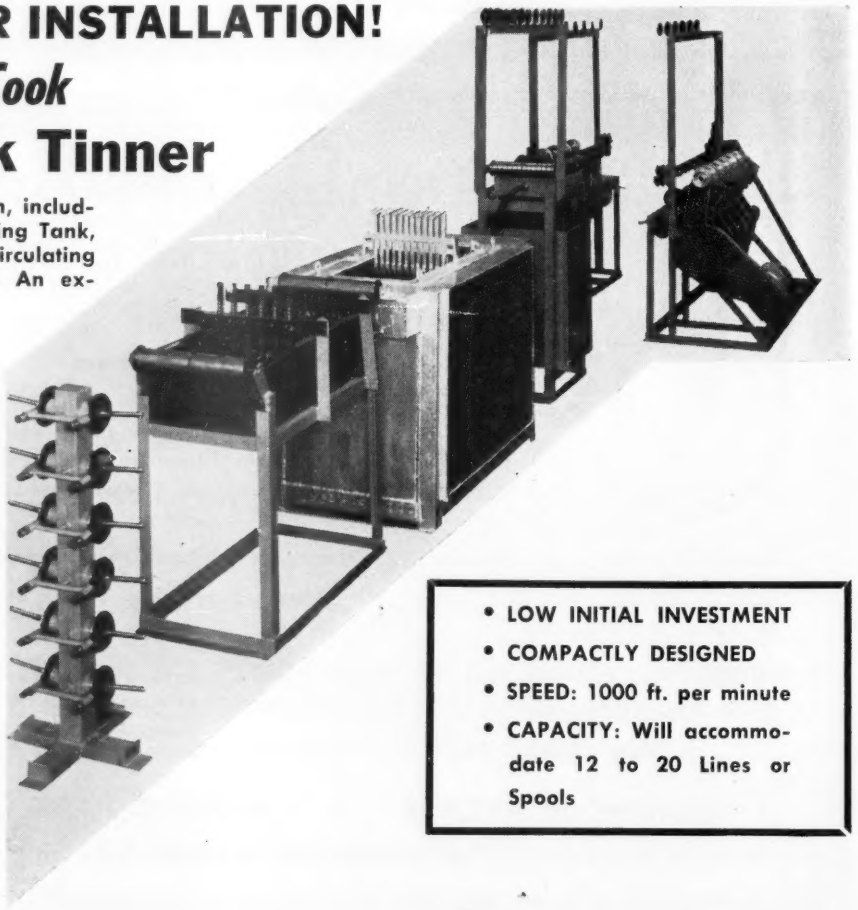
Coil springs are attached at their bottom portions to an elongated strap of rigid material, with a relatively rigid border wire extending longitudinally adjacent the lateral edges of the terminal coils of the coil springs away from the strap and having an end portion extending beyond the spring coil section into engagement with the corresponding end portion of the strap, the border wires being interconnected with the adjacent portions of the terminal coils of the coil springs, and the end of

NOW READY FOR INSTALLATION!

The New Cook

Hot-Dip Tank Tinner

Here's a complete tinning system, including: Supply Stand, Flux Pot, Tinning Tank, Water Cooling Tank with Recirculating Pump and Spool Take-Up Unit. An extremely fast unit producing uniformly tinned wire.



- **Can be built to accommodate customer's specifications as to supply and take-up spools.**

- **LOW INITIAL INVESTMENT**
- **COMPACTLY DESIGNED**
- **SPEED: 1000 ft. per minute**
- **CAPACITY: Will accommodate 12 to 20 Lines or Spools**

A complete Line of Quality Machinery For The Wire and Cable Industry To Meet Rigid Specifications.

COOK
MANUFACTURING CO.
50 EAST 25TH STREET
PATERSON, N. J.
ARMORY 4-6380

the border wire being connected to the corresponding end of the strap member.

★ ★ ★

No. 2,764,227, FORMED SPRING UNITS AND ASSEMBLIES THEREOF, patented September 25, 1956 by Richard J. Williams and Hyland C. Flint, Birmingham, Mich., assignors to American Metal Products Company, Detroit, Mich., a corporation of Michigan.

A spring unit made of a minimum length of wire is disclosed, comprising spring end portions made of straight sections of wire bent in V formation with torsion bars disposed laterally of the unit between certain of the straight sections for distributing strain over a number of the bars when deflected with a seating portion bent in V-shape to provide large open loops joining the spring end portions, and a tie rod joining one of the spring end portions to the seating portion.

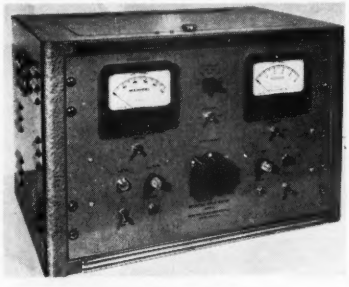
★ ★ ★

No. 2,764,298, APPARATUS FOR HANDLING COILED MATERIAL, patented September 25, 1956 by Alphonse F. Anjeskey, Cleveland, Ohio, assignor to The Cleveland Crane & Engineering Company, Wickliffe, Ohio, a corporation of Ohio.

The apparatus includes a U-shaped member, having pivoted legs, one of which is adapted to be inserted into an opening in the coil and having means for preventing displacement of the coil thereon. There is also provided a latch for the legs which cannot unlatch except when the legs are disposed in a vertical position.

New HV High Voltage Test Set

Peschel Electronics, Inc., 13 Garden St., New Rochelle, N. Y., has announced to the electric wire and cable industry the availability of a new high voltage DC test set, 100 KV, for non-destructive testing. It will test samples or full reels in tanks.



★ ★ ★

The set incorporates many unusual refinements and all safety and convenience features. Besides the 100 KV size, it is made in other ranges, from 5 to 200 KV.

Peschel Electronics specializes in testing equipment and makes a complete line for any required test on wire and cable that meets all standards.

★ ★ ★

A complete catalog on such equipment is available upon request.

Dies for Brass Rod Extrusion

Two problems — unpredictable product size and varying hardness after the metal hits subsequent drawing operations — have been overcome through use of chrome carbide dies for hot extruding brass in the Port Huron, Mich. plant of **Mueller Brass Co.**

★ ★ ★

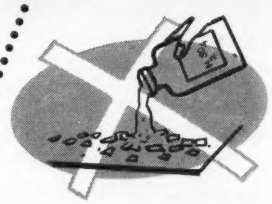
Application of the dies also is enabling the company to operate its hot extrusion lines on an automated basis as originally designed.

★ ★ ★

In hot extruding free machining brass rod, for example, an 8-inch diameter billet is reduced to 400 feet of 0.441-inch rod. Operation

STANNOUS SULFATE . .

A PREPARED chemical of UNIFORM quality for LIQUOR FINISHING



ELIMINATES haphazard preparation

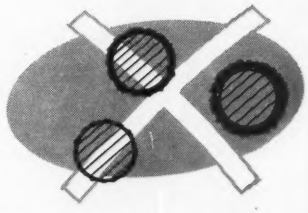
—Standard stock solutions are easily and quickly made up in advance . . . stannous sulfate composition is known, and is uniform from batch to batch.

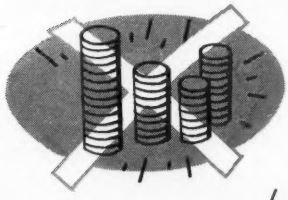
ELIMINATES complex control

—there are only two simple ingredients to control . . . color adjustment is quick and simple and may be made immediately.

ELIMINATES uneven quality

—tin content is divalent, the only form suited for iron replacement reaction . . . tin coatings are smooth and uniform, and of pre-determined thickness.





ELIMINATES unnecessary costs

—replaces needless processes, saves tin and copper, saves on time and labor, improves quality of tin coating.

Write for detailed information.

TIN & TIN CHEMICALS
CERAMIC MATERIALS
ORGANIC COATINGS
WELDING SUPPLIES
RADIOGRAPHIC EQUIPMENT
PLATING MATERIALS
METALS & ALLOYS
HEAVY MELTING SCRAP

"First Name in Tin Chemicals"

METAL & THERMIT CORPORATION

GENERAL OFFICES: RAHWAY, NEW JERSEY

of the 2750-ton, double-action Lowey press is so fast that billets are fed through a preheating furnace in six rows to keep up with the fast pace of the press.

★ ★ ★

To hold product size with previous dies under such conditions, it was necessary to change them frequently. This prevented unnecessary cold working of the material when subsequently drawn. Frequent die changes, however, also slowed production, since press downtime bottlenecked the automatic sequence of the hot extrusion process.

★ ★ ★

With the application of chrome carbide 608 dies supplied by **General Electric's Metallurgical Products Dept.,** the whole production picture changed. Tolerances in the case of the 0.441-inch diameter, free machining brass rod now are held within plus or minus 0.006-inch consistently, and tonnage production is at a new high.

★ ★ ★

A chrome carbide 608 type die, according to the company, duplicates the production feat of about 20 dies used formerly in hot extruding the brass rod of the size mentioned.

Haveg Adds Line of "Teflon" Tubing and Lined Pipe

Haveg Industries, Inc., 900 Greenbank Rd., Wilmington 8, Del., announces production of "Teflon" pipe and tubing and "Teflon" lined steel pipe. Pipe is being made in sizes up to 4" diameter; lined pipe in 2" sizes. It is also available in rods and special machine parts.

★ ★ ★

"Teflon", duPont tradename for tetrafluoroethylene resin, has a combination of electrical, chemical, and thermal properties unmatched by any other single material. It is completely inert to practically all chemicals. It has no known solvent, and is attacked only by molten alkali metals and fluorine at elevated temperatures and pressures. "Teflon" is completely resistant to nitric, hydrochloric, sulphuric, hydrofluoric, and hydrobromic acids. Also unaffected by highly oxidizing compounds such as aqua regia and sulphur or chlorine dioxides.

★ ★ ★

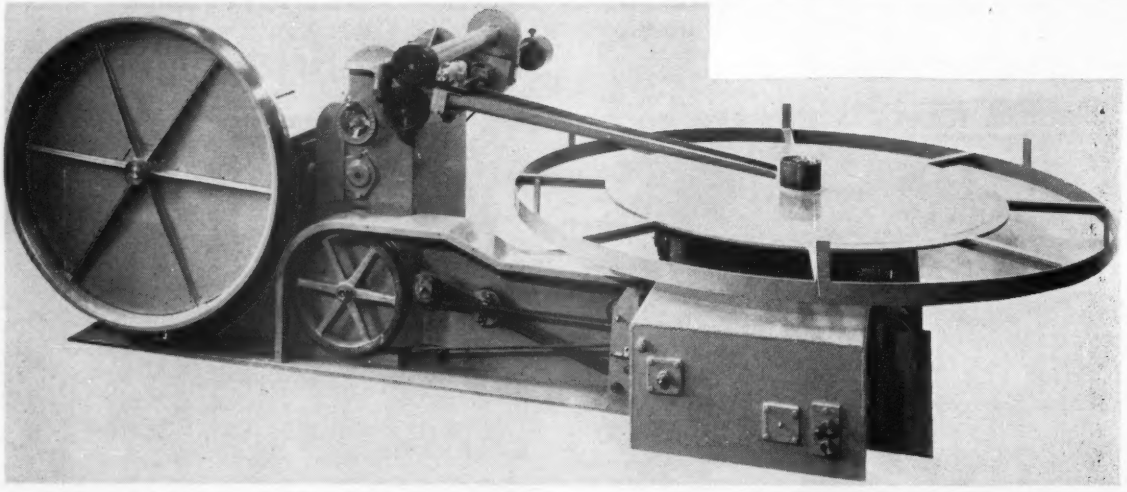
Haveg Industries, America's first molder of corrosion-resistant plastics, has been producing heavy-duty industrial plastics for twenty-five years.

G. E. Publishes Report on Irradiated Polyethylene

A twelve-page, illustrated technical report on Irrathene (R) irradiated polyethylene has recently been published by **General Electric's Chemical Development Department.** Irrathene is described as a unique insulating material which combines overload protection with the exceptional electrical and physical properties of conventional polyethylene.

★ ★ ★

The brochure cites other outstanding properties of the insulating material, including moisture



SINGLE TABLE PANNING MACHINE NO. 1149

Arranged to Accommodate 80" Diameter Pans.
Can be Built for Larger Pans.
Cut Shows 42" Diameter Capstan.
Wire Guide Spout is Stationary.
Table with Pan Traverses. Pan Table is provided with a Lock so that Table can be released for Hand Panning.
Can be Built as Shown or Opposite Hand.
Not Shown are the Main Variable Drive and also the Guard over the Traverse and Table Drive.

EST. 1855 AIMco INC. 1915
"American" INSULATING MACHINERY COMPANY
REG. U.S. PAT. OFF.
FAIRHILL AND HUNTINGDON STREETS
PHILADELPHIA 33 PENNSYLVANIA U.S.A.

and chemical resistance, encapsulation ability and thermal stability. Also described are performance characteristics, typical applications and techniques of use.

★ ★ ★

The new brochure, CDD-1-2, is available from Chemical Development Dept., One Plastics Ave., Pittsfield, Mass.

Wire Machinery Concern Increases Plant Space for Fourth Time

Federal Manufacturing Company, Wallingford, Conn., is celebrating its sixth anniversary in November as manufacturers of wire equipment.

★ ★ ★

Starting in a rented four-car garage in 1950 it outgrew its quarters and erected a new and larger plant in 1954. The demand for Federal equipment necessitated doubling the floor space the following year and now, because of continued growth, plans are under way to double the size of the manufacturing facilities once more to keep pace with customers' needs and the better to serve them.

★ ★ ★

At first only a few small machines were made. Today the line includes, Pay-offs, Capstans, Take-Ups, Respoolers, Wire Drawing Machinery (including a Payoff-Pak for which Federal has been licensed by Continental Can Co.) and many types of dielectric Testing Machines for insulated and enameled electric wires.

Elgin Issues Brochure on Carbide Tools

A new industry-service brochure on carbide rotary cutting tools has been issued by the Abrasives Division of **Elgin National Watch Co.**

★ ★ ★

The booklet presents Elgin's complete line of solid carbide end mills, rotary files and miniature cutters, and explains the use of such tools for scale and flash removal, blend and twist welds, machining in tight spots, as well as for de-burring, counter-sinking, and chamfering.

★ ★ ★

The booklet, it was announced by **William H. Baudouine,** division sales manager, is available without cost from 107 National Street, Elgin, Ill.

Twitchell Using Recording of Promotional Message Backed by Popular Song

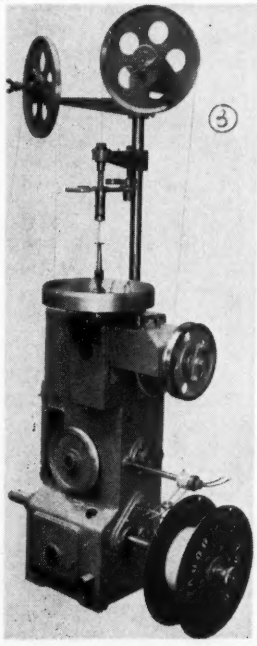
The advantageous uses of industrial yarns supplied to the wire and cable industry and rug and carpet trade by **E. W. Twitchell, Inc.,** Philadelphia, are being "aired" by an unusual promotional device—the mailing to buyers in these fields of a recording that has a popular song on one side and a specially slanted product message on the other.

★ ★ ★

The use of this unconventional advertising method by the Twitchell organization, which has long maintained a notably conservative

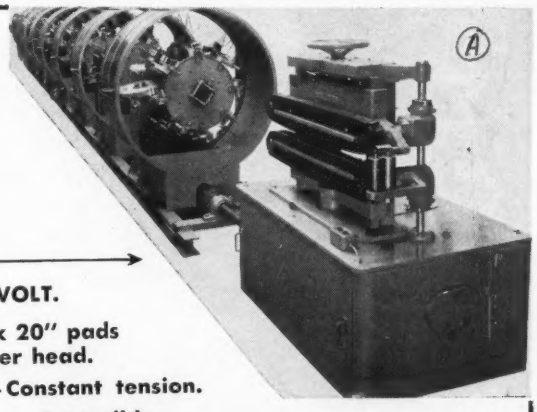
NEW...

IN PAPER LAPPING



FOR TELEPHONE

— High speed paper lapping.
— 3,000 r.p.m.
— Movable drum.
— Automatic stop.
— 12" pad.
— Electric counter.
— Central lubrication.



FOR HI. VOLT.

— 8 x 20" pads per head.
— Constant tension.
— Extensible pad centre.
— Individually braked.
— Variable die.
— Caterpillar haul-off.
— P.I.V. drive.
— Automatic stop.

POURTIER MACHINES

153, rue Général Galliéni

ROMAINVILLE (Seine) FRANCE

approach to promotion, stems largely from the circumstance that **Garwood Bacon,** a company vice president and head of the industrial yarns division, has a professional sideline as a composer and interpreter of popular music.

★ ★ ★

As a Christmas remembrance last year, Mr. Bacon sent out copies of a commercially produced recording he had made under his "show business" name of "Billy Woods," which had been featured on many radio and television programs.

Tool for Joining ACSR Cable

A new tool developed by **Aluminum Company of America** makes possible a quick, simple, cost-cutting technique for joining the smaller sizes of single core Aluminum Conductor Steel Reinforced (ACSR).

★ ★ ★

Plier-like in appearance, the tool forms hooks in the steel core of the more popular sizes of subtransmission and distribution ACSR. The cores then are hooked together and clinched. An aluminum sleeve then is centered over the joint and compressed, completing a connection having a minimum of 95 per cent of conductor strength and offering low electrical resistance.

★ ★ ★

Hook joints are made in ACSR sizes #6 to 2/0 inclusive and in other conductors with similar core sizes. A demonstration of the new tool can be arranged by writing to Aluminum Company of America, 2307-W Alcoa Bldg., Pittsburgh 19, Pa.

Basket for Heat Treating and Quenching

A sturdy steel basket, specially constructed for moving heavy aluminum castings to and from heat treating furnace and quenching tanks, is announced by **Wiretex Manufacturing Co.**

★ ★ ★

The unique structure of the basket, with its four lifting hooks, makes it easy to lift the castings with a movable crane. Unnecessary secondary handling is entirely eliminated. A door in the front of the basket facilitates unloading. Each basket weighs approximately 2000 pounds and is capable of handling a workload exceeding 10,000 pounds.

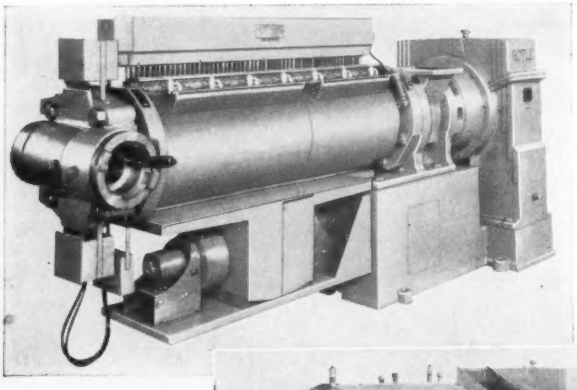
★ ★ ★

For information, write Wiretex Manufacturing Co., Inc., 40 Mason St., Bridgeport 5, Conn.

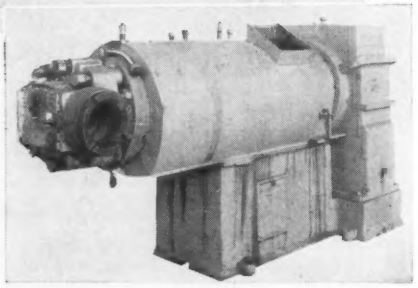
Heavy Duty Wrapping Machine Introduced

Larmuth (1947) Ltd., Swinton, Manchester, Eng., has announced a new heavy duty wrapping machine that will wrap heavy coils on bundles of straight lengths of bars, tubes, etc.

★ ★ ★



8½" Spirod extruder with side delivery head for jacketing. Up-graded from circulating type shown to the right.



EVER THINK OF UP-GRADING TO SPIROD®?

Yes, it can be—and is being—done. And Royle's traditional approach to extruder development, the retention of features that have stood the test of time, makes it possible. The one-piece cylinder with built-in hopper is replaced by a separate cast steel hopper section, a cast steel cylinder with deep grooves that create fin-like separations for the rod type heating elements and the selective evaporative cooling equipment. Head and stock screw, as usual, are designed for process requirements.

If you are operating an older type Royle extruder you should investigate up-grading to Spirod—the electrically heated extruder with high velocity evaporative cooling—for maximum efficiency in controlled operating temperatures.

Write for Bulletin # 463

JOHN ROYLE & SONS ROYLE PATERSON N. J. 1880

PIONEERED THE CONTINUOUS EXTRUSION PROCESS IN

London, England — James Day (Machinery) Ltd. — Hyde Park 2430 - 0456

Home Office — V. M. Hovey J. W. VanRiper — SHerwood 2-8262

Akron, Ohio — J. C. Clinefelter — BLackstone 3-9222

Los Angeles, Cal. — H. M. Royal, Inc. — LUdlow 9-3261

Tokyo, Japan — Okura Trading Co., Ltd. — (56) 2130 - 2149

The machine will wrap, using paper 4″ to 6″ wide, coils up to 15″ in thickness, with 30″ to 60″ outside diameters (or more, if required) and weighing as much as 2 tons.

★ ★ ★

Wrapping speed is approximately 100 laps per minute, the overlap is variable and a paper edge-folding attachment is included. The complete line now covers machines for wrapping coils and lengths in widths of from 3″ to 15″

★ ★ ★

A centralized pushbutton station controls all operations. Coils are fed in at ground level and can be lowered and ejected in and out of the feed rollers by a pneumatically operated unit.

New Teflon Treated Glass Yarns

Teflon coated glass yarn that doesn't change colors when exposed to high temperatures is now available in white and all colors. It can be furnished semi-cured or sintered.

★ ★ ★

These Teflon coated yarns have good tensile strength and an operating range from -100°F to 500°F. In addition to a high degree of chemical inertness it has excellent electrical properties over a wide range of temperatures and frequencies, and a low flow under heat and pressure.

★ ★ ★

Principal uses for this new yarn are for insulation on aircraft control cable and high temperature lead wire.

★ ★ ★

For further information, write **Chemo Textiles, Inc.,** West Warwick, R. I.

Isonel Enamel Gets U. L. Approval

The first approval by Underwriters' Laboratories, Inc., of Isonel enameled wire for Class B electrical insulating systems has been announced by **Schenectady Varnish Co., Inc.,** of Schenectady, N. Y.

★ ★ ★

J. W. McHugh, Vice-President, who made the announcement, said the results officially approved the fact that properly designed electrical equipment utilizing Isonel enameled wire could successfully withstand hot spot temperatures of 130°C over long periods of time.

★ ★ ★

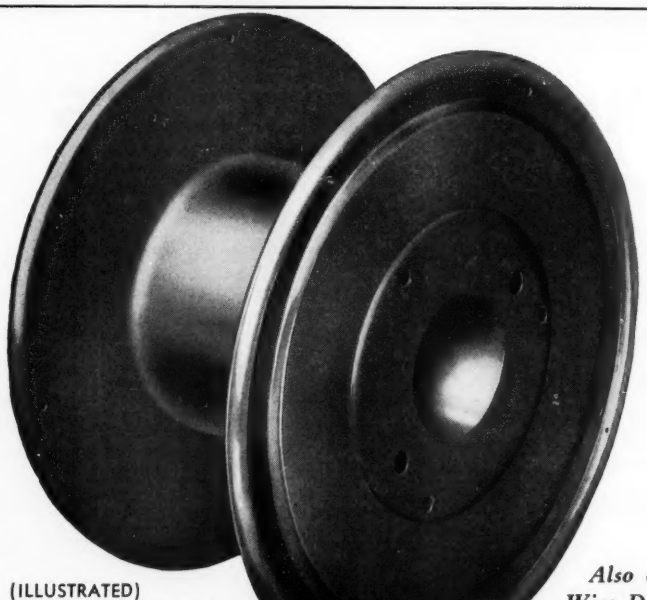
In accelerated aging tests recently completed by Underwriters' Laboratories, samples of Isonel enameled wire exhibited excellent dielectric strength and flexibility after aging at 153°C for ten weeks. Motors wound with Isonel wire operated at 180°C for ten weeks with no sign of break down.

★ ★ ★

Isonel wire samples also exhibited excellent chemical resistance when immersed for 24 hours in various solvents, he declared.

★ ★ ★

This wire enamel is a polyester



(ILLUSTRATED)
42" x 20" x 21"—(4000# cap.)

HEAVY DUTY
BREAK-DOWN REELS

1000#
2000#
4000#
} capacities

Rugged Design including patented DURA-CURL rim, and many other features necessary to provide the *Strength* and *Durability* needed for continued successful performance.

Also complete line of sizes of Modern High Speed Wire Drawing NO-CREV Spools and Reels for both fine and intermediate size wire.

Telephone
Attleboro 1-0848

Mossberg PRESSED STEEL Corporation

18 WEST ST., ATTLEBORO, MASS., U.S.A.

James Day (Machy) Ltd.
28 Maddox St.
London W.I. England

#101

type introduced by Schenectady Varnish last year. It has similar handling characteristics and properties to regular Class A wire enamels. Accelerated aging tests in the company's laboratories however, indicated that Isonel enamel would withstand hot spot temperatures of 150°C—well above the 105°C performance of Class A enamels.

New Precision Pin and Small Parts Grinder Announced

Dykrex Corporation, Newark, N. J., manufacturers of wire die finishing machinery, has started production on a new low-cost precision pin grinder.

★ ★ ★

Originally developed for one of America's largest manufacturers of telephone equipment, this new grinder will grind lapping pins or special parts up to a 90 degree included angle.

★ ★ ★

For additional information and prices on this Model WE Grinder, write to Dykrex-Roos Corp., P. O. Box 9022, Northeast Station, Newark 4, New Jersey.

Data Booklet on Properties of Nickel Alloys at Low Temperatures

A new, fully illustrated booklet entitled, "Some Properties of Inco Nickel Alloys at Low Temperatures," has recently been issued by **The International Nickel Co., Inc.** The bulletin describes the various wrought and cast high-nickel alloys used at low temperatures and arranges these data in a most useful manner for engineers and designers of equipment. The data cover only those materials which are in current use.

★ ★ ★

The booklet is available without charge through the Readers Service Section of The International Nickel Company, Inc., 67 Wall Street, New York 5, New York.

Anaconda Develops a Solderable Film-Coated Magnet Wire

A vastly improved film-insulated solderable magnet wire, Analac, has been announced by **Anaconda Wire & Cable Company.**

★ ★ ★

This improved wire can be used exactly like Formvar or plain enamel, but without the necessity of removing the insulating film to make joints either during the winding process, or when attached to lead wires or to some other conductor.

★ ★ ★

The major benefit is a saving in labor wherever a large number of soldered connections are to be made or where the small diameter of the wire makes other means for removal of the insulating film a hazard to the insulation or the wire itself. If the user wishes, Analac's polyurethane film may be removed by mechanical and chemical means as well as by soldering.

★ ★ ★

WRITING TECHNICAL ARTICLES

AN INVITATION

YOU derive much benefit from the articles that appear in WIRE AND WIRE PRODUCTS and in turn might well share your knowledge with others in the Wire Industry. That helps to keep the industry progressive and prosperous. We are glad to pay for wire or wire product papers, but many authors prefer to contribute articles for the good of the industry. All such articles or papers contributed by members of THE WIRE ASSOCIATION are eligible for the Medal Award or Certificates of Honorable Mention.

Won't YOU help out by writing for WIRE AND WIRE PRODUCTS in 1957?
Write to the

EDITOR

WIRE AND WIRE PRODUCTS

453 MAIN STREET • STAMFORD, CONNECTICUT

Analac is colored red with a stable dye used for identical applications for many years making it easily identifiable in any size. It has excellent abrasion resistance and will withstand all normal winding conditions. Dielectric loss, dielectric strength and dielectric constant all make it suitable for use in windings that generally are used on electronic devices.

Seneca Wire to Expand and Modernize

H. J. Blaser, President and General Manager of **Seneca Wire and Manufacturing Co.,** Fostoria, Ohio, announced an expansion and modernization program in excess of one million dollars, which the Company plans to complete within a year. It will provide for improved facilities for almost every department of the mill. Some present equipment will be replaced by the most modern production units available. New machinery and equipment will be added to provide increased manufacturing facilities and the plant's entire electrical system will be modernized. In addition to the erection of a new building, several existing buildings will be enlarged.

★ ★ ★

The over-all plan will provide greatly increased capacity, greater flexibility, elimination of bottlenecks in production and an opportunity to prepare for new markets. The Company will have in excess of 500,000 sq. ft. of production floor space.

★ ★ ★

A substantial volume of Seneca's production goes to the Company's two subsidiaries; **Standard Wire Cloth Co.,** which moved last month into a new modern 100,000 square foot building at Brookhaven, Miss., and **Keystone Wire Cloth Co.,** Hanover, Pa.

Announces New Abrasion-Resistant Cables

A new line of cables, which have Teflon jackets in addition to Teflon dielectric, is now available from the **Federal Telephone & Radio Co.,** a division of **International Telephone & Telegraph Corp.,** Clifton, N. J.

★ ★ ★

The new line is the result of advanced production techniques. These developments permit the manufacture of Teflon jacketed cables in nominal diameters up to .420". The jackets are treated to provide abrasion resistance and also have the normal ability of Teflon to resist solvents and withstand elevated and low temperatures.

★ ★ ★

Cables are currently available in five types; K-352, CE-282-A, CE-282-B, CE-282-C, and CE-118-S. Additional standard Teflon jacket-and-dielectric types will be announced. In addition, Federal's engineering department readily provides designs to meet special customer requirements.

★ ★ ★

Complete information on the cables may be obtained from the Components Division, Federal Tele-

CAMDEN WIRE CO., INC.

Wire Fabricators

Producers of Quality Fine Wire Copper Conductors

EXTRA FLEXIBLE CONDUCTOR STRANDED OR BRAIDED

MULTIPLE ENDS OF SIZES .008 to .002

BARE · TIN or LEAD COATED · SILVER PLATED

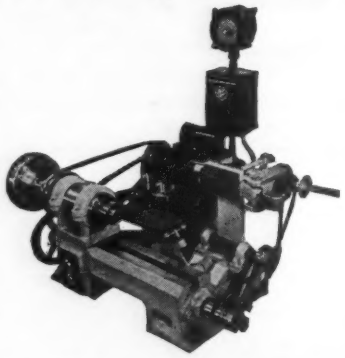
Special Heavy Tinned Conductors for Hook-up Wire

40 MASONIC AVENUE • **CAMDEN, NEW YORK**

CUT
Die Room
COSTS
50%
with the New type "M"

DYKREX
"IT CORRECTS THE DIE"

automatic Polishing Machine



Double your finished Tungsten Carbide Die production

•

Save ½ labor costs—

•

The new automatic polisher with the Time Switch—

•

It is completely assembled—just plug it in!

ROOS TOOL & MFG. DIVISION
Dykrex Corporation of America
manufacturers of
Wire Die Finishing Machinery

33 Bloomfield Avenue
Newark 4, N. J.

Western Union
Teletype Service
QAB-WUX—Montclair, N. J.

The Standard of the Wire Industry

phone & Radio Co., 100 Kingsland Road, Clifton, N. J.

Sheet and Tube to Build New General Offices

The Youngstown Sheet and Tube Company will build a modern, new three-story general office building, according to an announcement by **J. L. Mauthe,** president.

★ ★ ★

It will be constructed on a 52-acre plot just south of Boardman Center on Market Street and should be ready for occupancy late in 1957. The building will be completely air-conditioned and have a total floor area of approximately 183,000 square feet.

★ ★ ★

Mr. Mauthe indicated that present office facilities in the Stambaugh Building had become inadequate for the Company's growing employee force and said that the new building would provide ample space for future expansion. Construction will start as soon as the ground can be cleared.

Harper Expands Tube Furnace Line

Continuous carbon tubular element furnaces with tube sizes up to 6" I.D. are now available from the **Harper Electric Furnace Corp.,** Buffalo, N.Y., manufacturers of high temperature industrial electric furnaces and kilns.

★ ★ ★

First announced by Harper for high temperature research several years ago, this type of furnace permits uniform heating of work within a graphite tubular resistance element in which temperatures up to 5000F. can be indefinitely maintained.

★ ★ ★

The new furnaces feature continuous operation with automatic mechanical pusher, entrance preheating chamber and water-cooled cooling chamber. Purge chambers may be added to maintain low dew-point reducing atmospheres. Quick-opening end compartments permit easy tube replacement.

★ ★ ★

Overall length of the largest unit is 28 feet. Research models with tube diameters down to 1" are available.

Auto-Lite Announces New Wire and Cable Catalog

A new 24-page catalog on wire and cable for car, truck, tractor and marine use has been announced by **The Electric Auto-Lite Company,** Toledo 1, Ohio.

★ ★ ★

The catalog gives complete information on spark plug wire, battery cables, primary cable, lighting wire, terminals and spark plug wire sets. Application information for spark plug wire sets and battery cables is included. A special section devoted to terminals and battery parts is fully illustrated.

★ ★ ★

Identified as C-541, the catalog is available through Auto-Lite Wire and Cable wholesalers.

New Signode Packaging and Carloading Guide

The 17th edition of Packaging and Carloading Guide has just been published by the **Signode Steel Strapping Company.**

★ ★ ★

This handy, 48 page booklet—free to all who request it—tells how to package and carload for maximum product protection at minimum cost.

★ ★ ★

Signode's complete line of packaging and carloading materials—Strapping, Seals, Strapping Tools, Grain Doors, Retaining Strips, etc.—are shown and described, and instructions are given in their application.

★ ★ ★

To get a copy write the Signode Steel Strapping Company, 2600 North Western Ave., Chicago 47, Ill.

Fenn Offers New Laboratory Rolling Mill

The Fenn Manufacturing Company, Newington, Connecticut, one of the leading manufacturers of precision metal forming equipment, has announced an addition to its standard line of rolling mills. The new, large combination laboratory mill (2½" x 8⅜" x 8") designated as Model 4-083, is capable of taking heavy reductions on ferrous strip at all speeds between 100 and 500 fpm. It can be used as a two-high mill, or as a four-high mill featuring driven back-up rolls or work rolls. Many drive combinations can be incorporated to meet customer specifications and the mill can be powered to take reductions up to 0.080" per pass on ferrous strip. Maximum torque is 21,000 pound-inches when the mill is work roll driven, and 120,000 pound-inches when used as a two-high mill or back-up roll driven four-high mill. Maximum separating force is 300,000 pounds at 100 fpm.

★ ★ ★

Designed and built as a companion to the popular smaller Fenn mill, the Model 4-083 features a floor-mounted spindle type pay-off reel with air brake for back tension, a dual motor power screwdown unit, a force-feed lubrication system, an internal-external coolant system, and auxiliary operator control stations mounted on the mill and reel.

The Electric Wire and Cable Industry in Canada

Comments by **Edmund S. Rose,** President of **Standard Wire and Cable Ltd., Toronto,** about Industry in general and the Wire and Cable Industry in particular.

★ ★ ★

For several reasons it is logical that Canada should develop and expand its wire and cable industry to the greatest possible degree. We are one of the world's leading producers of two of the major raw material components in the manufacture of electrical conductors, copper and aluminum. It is unfortunate that we, as a rising young industrial power, should be content

STEEL TAPE HEAD

FOR TWO METAL DISCS 28" DIA. X 2½" WIDE AT A SPEED OF 70/120 R.P.M.

Speed change by gear quadrant, having forward, neutral and reverse.

Ball race bearings.

Adjustable self-centering roller die box to steady cable.

Pads or discs adjustable for angle by worm and wheel segment, longitudinally adjustable by screw and key.

Adjustable steady rollers close to taping point.

Tension applied to tape by adjustable friction shoes and disc. This remains constant after first setting.

MAKERS OF PLANT FOR ELECTRIC CABLE, BRAIDING & WIRE ROPE

B. & F. CARTER & CO., LTD. BOLTON, ENGLAND

TELEGRAMS: "BRAIDERS BOLTON"

MACHINES FOR COPPER • STEEL • BRONZE ALUMINUM • ALLOY WIRES

SPECIALIZED EXPERIENCE

TWISTING • STRANDING BUNCHING

CONTINUOUS TENSION CONTROL FOR PRECISION QUALITY

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HASKELL-DAWES MACHINE COMPANY

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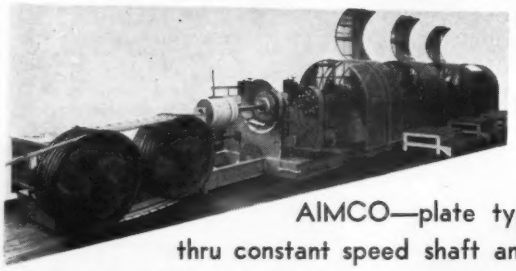
4-WIRE TWISTING MACHINES



CABLE REELS 48" DIA.-31" O. A. WIDTH.

FILLERHEAD 24 PACKAGES 12" DIA., 12" TRAVERSE.

AIMCO—plate type serving head driven thru constant speed shaft and variable speed drive. Taping head 24" pad driven thru constant speed shaft and variable speed drive.

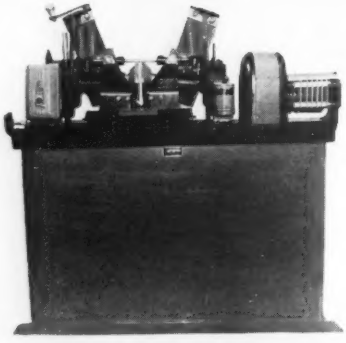
Capstans double 6 groove 42" root diameter. Rates of lay from 3" to 50". Flyer speed 8 steps from 600 to 34 R.P.M. Handles large diameter wires on cradle reels.

An exceedingly efficient and versatile machine.

THE EDMANDS CO. 860 WELLINGTON AVE., CRANSTON 10, R. I.

PROFITABLE STRIPPING

OF YOUR SCRAP AND REJECTED WIRE & CABLE IS GUARANTEED WHEN YOU HAVE THE RIGHT MACHINE ON THE JOB.



Many of our machines have been in service up to 10 years. Our later MODEL "526" (pictured), with a capacity of 5/16" to 6", is now the accepted leader in the scrap and salvage trade. Strips short or long lengths, or off the reel.

For FAST and CLEAN CUTTING, in most cases actually taking the cable apart. No other machine can match the patented cutting action of the "526".

SAVES ALL RUBBER, PLASTIC, LEAD, COPPER AND ALUMINUM

Several models available for small or special work and plastic tubing.

Detailed information available—ask for it

HOWARD A. BURDWOOD, INC.

P. O. BOX 2115, 120 THADEUS ST., SO. PORTLAND, MAINE

to export so much of our raw materials and semi-finished materials, rather than develop a strong secondary industry. How much better is it that Canadians should not only mine and smelt the metals, but also design, manufacture and market their products for Canadian consumption, and for a growing but neglected export market throughout the world.

★ ★ ★

The increased need for electrical conductors brought about by the applications of "automation" and "electronics" during the past ten years creates an almost insatiable demand, and during the next ten years the electric energy output from hydro and atomic sources will be increased over 100 per cent. In addition, a much-needed Adequate Wiring Program to encourage and facilitate the rewiring of more than seventy-five per cent of all the residential buildings in Canada is just getting under way, and receiving enthusiastic acceptance. Large scale developments and projects are finding the supply of electrical conductors to be a major bottleneck and their requirements are only beginning. There will be more appliances installed for the convenience of our people . . . more controls and systems to enable our industries to produce better products faster . . . resulting in increasing demands for electrical conductors!

★ ★ ★

What is the answer? With domestic suppliers of wire and cable producing to capacity and suppliers in the United States and Great Britain unable to cope with commitments, the answer lies in the development and expansion of domestic manufacturing potential.

★ ★ ★

The entry of Standard Wire and Cable Ltd. into the wire and cable field as a major producer, is the first in over a decade. Every new development in automation and engineering have been incorporated to make the new Plant located at 70 Wingold Avenue, Toronto, the most modern of its kind in North America. Together with a nation-wide marketing and stock system,

the productive capacity of this new plant will enable the company to deliver fine quality, fully tested and inspected cables to customers—evidencing a trend that will be beneficial to Canada.

New Research Lab Planned by U. S. Borax & Chemical

An orange grove in Anaheim has been selected as the site for a completely modern research laboratory for **United States Borax & Chemical Corporation.**

* * *

The laboratory will be fully equipped for all phases of chemical research, with special facilities to be provided as follows: Distillation room, instrument laboratory, heavy experimental equipment room, and a greenhouse for agricultural investigations. A library will be centrally located for convenient use by the professional staff.

* * *

The laboratory will conduct research for all three operating divisions: the **Pacific Coast Borax Co. Div.,** United States Potash Co. Div., and 20 Mule Team Products Div.

* * *

American Brass Division Changes Name

The Waterbury Brass Goods Division of **The American Brass Co.** has officially changed its name. It now becomes the Fabricated Metal Goods Division, which is more descriptive of its operations, since it manufactures specialties from flat or sheet metal, particularly products of small size and close tolerance. The announcement was made by **John A. Wright,** vice president in charge of the division.

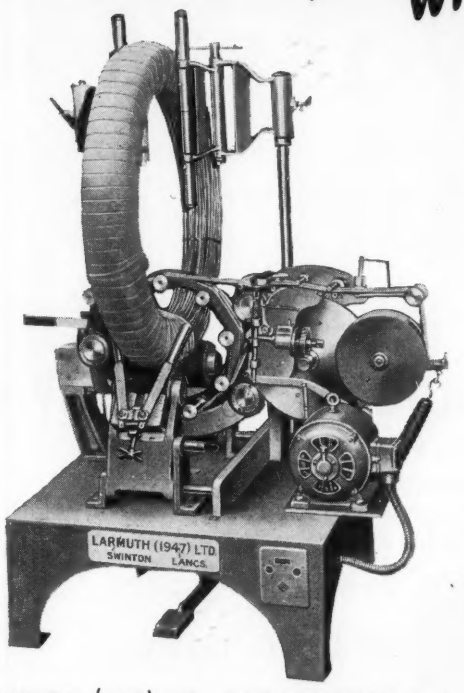
* * *

Organized as the Waterbury Brass Goods Corp., in 1904, the company combined manufacturing operations of two of American Brass's predecessors—Benedict & Burnham Co. and Holmes, Booth & Haydens Co. The late **John A. Coe, Sr.** was its first president.

* * *

For many years the items pro-

LARMUTH *Spiral Wrapping* MACHINES



are built to finest British engineering standards and are in use throughout the world for spiral wrapping of Motor Tyres, coils of Wire, Strip, etc., from 3" bore upwards. Also straight length Tubes, Bars, Rods, etc.

"BOUND" to get there safely.

Please send detailed dimensions of your products.

LARMUTH *of England*

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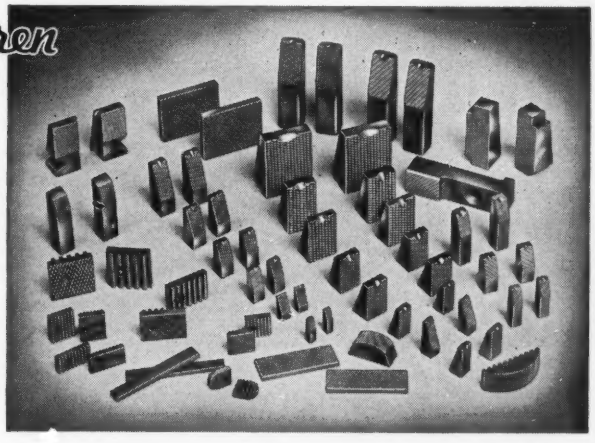
Sjogren

JAWS....

for Wedge Grips, Pullers and Tensile Testing Machines of all makes are available either from stock or manufactured to order. A Sjogren jaw, made to meet your requirements, guarantees you service.



SINCE S&S 1927

Used by Wire Men Who Want the Best!

SJOGREN TOOL AND MACHINE CO., INC.

WIRE PULLERS • WEDGE GRIPS • JAWS FOR ALL MAKES OF PULLERS AND TESTING MACHINES • CAGE ROLLERS • SWAGING HAMMERS • POINTING DIES • WIRE SPOOLERS

14 SWORD STREET AUBURN MASSACHUSETTS

MIL-W-16878

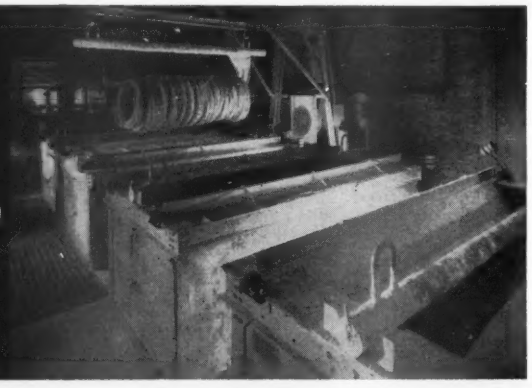
IF YOU ARE HAVING DIFFICULTY
IN MEETING THE REQUIREMENTS OF
THESE SPECIFICATIONS, IT MAY PAY YOU

TO COMMUNICATE WITH

ELECTRONIC RUBBER COMPANY
69 SUNNYSIDE AVENUE
STAMFORD, CONN.

MANUFACTURERS OF VINYL COMPOUNDS
FOR SPECIFIC END USES UP TO 125° C.

carl mayer
HI-SPEED REGISTERED
ROD BAKERS



Faster baking, greater fuel economy, maximum production efficiency are just a few of the results of the exclusive heating arrangement of the Carl Mayer Hi-Speed Rod Baker. It also has a patented blow-off feature which removes moisture without damage to coils.

Here are just a few of our many satisfied customers:

American Steel & Wire Co.
Atlas Steel Co.
Colorado Fuel & Iron Corp.
Crucible Steel Co. of America
Driver-Harris Co.
B. Greening Wire Co., Ltd.
Indiana Steel & Wire Co.
Jones & Laughlin Steel Corp.
Republic Steel Corp.
Sheffield Steel Div., Armco Steel Corp.
Steel Company of Canada

Write for Bulletin No. 350

Patent Nos.
U. S. A. 2,296,361
2,322,828
2,235,559
Canada 396,144
401,589

THE carl mayer CORP.
3030 EUCLID AVE., CLEVELAND 15, OHIO
OTHER PRODUCTS: Core Ovens • Mold Ovens • Welding Rod Ovens • Heat Treating Ovens & Furnaces • Special Processing Equipment and Accessories.

duced by this company were made principally of brass or other copper-base alloys. Since World War II, there has been considerable expansion of varieties of metals used in its products—including aluminum, nickel silver, steel, stainless steel, zinc and others. It supplies industry with eyelets, grommets, screw shells, radio tube base pins, ferrules, clips and custom-made, multiple-plunger press products.

Record Number of Tourists Visit Steel Industry "Birthplace"

An increasing number of tourists are discovering that the Saugus Ironworks Restoration located in Saugus, Mass., is an interesting place to visit.

★ ★ ★

Attendance this summer has been averaging almost 1,000 persons a week compared with 650 for a like period last year, according to **Frederick A. Bonsal**, curator.

★ ★ ★

Reconstructed in a picturesque setting along the banks of the winding Saugus River, the colonial ironworks at Saugus is an authentic replica of the original plant which operated from about 1646 to 1670.

★ ★ ★

Although built more than 130 years before the American Revolution, the Saugus Ironworks was a modern plant for its time and considered the industrial wonder of its day. The ironworks' blast furnace, forge and rolling and slitting mill furnished much of the iron needed for a fast growing country.

★ ★ ★

In 1954 the reconstruction of the Saugus Ironworks was completed by the American iron and steel industry to dramatize the plant's historical and educational significance. Over $1,500,000 was spent to make the ironworks an authentic reproduction of the original. It is open through November 30th.

Alcoa Nails to be Distributed

Aluminum Company of America has announced plans to place its

line of aluminum nails and fasteners on retailers' shelves this fall.

★ ★ ★

Increased nail production at a new plant in Lancaster, Pa., combined with a comprehensive system for national distribution, will make the Alcoa line of non-rusting, non-staining aluminum fasteners widely available. The product line previously was supplied principally to industrial users.

Wear on Nail Manufacturing Machines and Its Effects

(*Continued from page* 1351)

forward and backward, thereby changing the cutting point of the knives during the run of the machine. This defect continues, until the shear axes suffer such a great wear that they must be replaced, while lack of tightness on the adjusting sleeve should periodically be tested, whether it is a result of dry wear or looseness of the limiting nuts between the axle collar and nuts. Drawing up the nuts snugly is sufficient remedy. With serious wear of the shear axes, these, according to their condition, may be turned down or replaced.

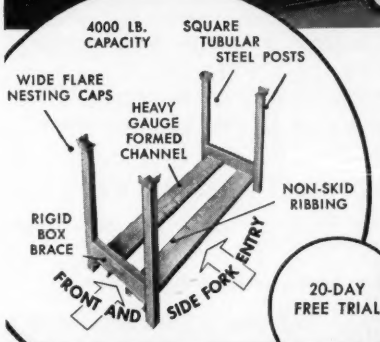
★ ★ ★

The bearings will then mostly show still stronger wear. In case the adjustment is not accomplished by means of bushings or sleeves, but directly in the frame of the machine, then it is advisable to enlarge sufficiently the worn out bearing place in order to be able to undertake sleeve bearing.

Damaged Lever Pins, Rollers and Tapers

In the second place will be listed lever pins, rollers and tapers, which must be reconditioned as needed, as soon as deficient pressure or unequal cutting of the knives is noticed, as rolls with flattened places on the contact surface can exert unequally strong pressure upon the dies and knives. Flattening of the die roll causes failure of upsetting; flattening of the knife rolls however causes failure of the knives to cut through, and nails with adhering point scrap result. By adjustment of the knives, however, these now,

JARKE
PORTABLE
WIRE COIL RACKS



Solve Wire Coil Storage Problems

Makes handling and storing of unwieldy wire coils a simple one-man operation. Improves plant housekeeping, saves space, provides positive inventory control. Front and side fork entry permits closer stacking and greater maneuverability in narrow aisles. Saves time, labor, cuts costs. Standard and special sizes.

20-DAY FREE TRIAL

JARKE MANUFACTURING COMPANY

Send for Details
5405 Broadway
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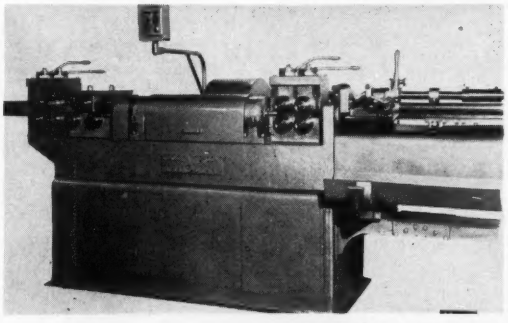
MODULAR STORAGE SYSTEMS FOR METAL INDUSTRY • STEELMOBILE

New, Fast STRAIGHTENER and CUTTER

Handles 1/4" to 1/2" Wire—3" to 50' Lengths



Model 9A, pictured, is for ferrous or non-ferrous heavy wires. Other models accommodate smaller stock.

The 9A feed and speed can be varied from 70 to 200 feet per minute.

OTHER FEATURES

Wichita low-inertia air tube clutch and air brake makes quick, clean and positive cut-off possible. Electric actuated trip. Motor control switch on swinging pendant. Tool storage in base. Bundling brackets. End pull-through device. Two 4-roll feed housings for positive feeding. Many other refinements—all features of the 9A and other models for finer wires.

ALSO MANUFACTURERS OF WIRE REELS AND HI-HATS.

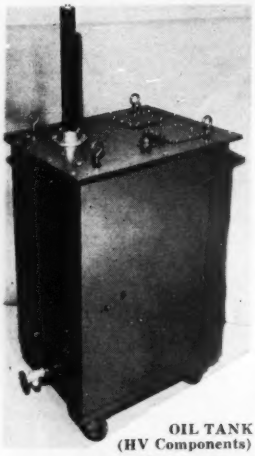
Send your requirements and ask for details.

The Geo. C. PATTERSON MACHINE Company

3409 Trumbull Street • Cleveland 15, Ohio

100 KV DC TEST SET (Overpotential Testing)

For Non-Destructive Insulation Testing of Sample, or Full Reel Tank Testing.



OIL TANK
(HV Components)

1. Con. var., 0-100 KV output voltage.
2. Adequate cap. for rapidly charging full reels.
3. Automatic output shorting.
4. External (aux.) interlock provision for test cage.
5. KV meter and current meter for determining leakage resistance—both meters dual range.
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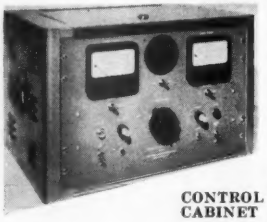

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through the increased pressure of the undamaged parts of the contact surface, become quickly deformed and useless, and must be frequently changed.

★ ★ ★

Excessively driven tapers which decrease the opening of the knives must, after elimination of the existing grooves, be leveled up again by means of a correspondingly thick shim to the original height, as with too small an opening of the knives, that is, with too little thrust, with the least retardation of the opening a knife, or even both knives, can be grazed by the heading stamp and rendered useless. This always results, incidentally, also if the shear axes are fitted too tight or the shear springs are too weak.

The Pressure Lever

In third place can be mentioned the die pressure. Here the action results by means of a lever with roller over the pressing taper. The roller is severely stressed, and it must be regularly lubricated, as by its erosion, aside from the roller also, the pressing taper will be pulled in conjunction with it. On the lever itself the bore and the pin are to be observed as places of probable wear. With too great looseness lost motion will result which will retard the opening of the dies, and this, as in the high-speed machines, leads to buckling of the wire. After bushing of the pressure lever and installation of a fitted pin the action will again be satisfactory.

The Hammer Slide

This is relatively long and shows little wear, so that an occasional reconditioning of the cover plates is sufficient. The case-hardened pressure piece in the hammer sliding head must be more frequently renewed. The hammer eccentric exerts (especially with large-headed nails, which need a strong striker spring pressure) with the back pressure of the hammer sliding head and also the stretching of the striker spring, a rather strong friction on the pressure piece, whereby especially its lower slide edge becomes worn; to a less de-

gree also the hammer eccentric, should be well hardened.

★ ★ ★

Corresponding to the extent of wear, the hammer sliding head will now be pressed back a less distance, and the distance between dies and stamp is diminished. With the production of longer nails, the head will be drawn forward to the stamp and, as the nail cannot drop quickly enough, will be deformed by the heading stamp and thus rejected. The installation of a shorter stamp can somewhat eliminate this damage, in case the stop faces of the hammer sliding head now do not chatter on the frame of the machine, for jarring blows of the hammer sliding head, which in the production of nails with light heads can come also on the dies, lead to its rupture. The striker springs should then be exchanged for those with less tension so that the sliding head vibrates with less pressure.

The Take-In Elements

In fifth and last place comes the take-in. Since the R.P.M. is lower than in the high-speed machines, the wear will be already considerable when trouble arises. This shows up in marked variations in length, as the worn-out parts resulting from the looseness knock more or less instead of sliding smoothly.

★ ★ ★

The vibration of the machine is transmitted to the take-in elements; this brings about uneven and variable grip of the take-in bit, which naturally leads to variable lengths. Wear appears first on the pivot pin of the bit holder and draw-bar pin, later also on the slides or the sliding bars, according as the machine is constructed. Bit marks over the whole length of the nails disclose wear of the bit holder in the pivot, if indeed its spring is not also too weak. The spring of the bit holder gives way in both cases with each vibration instead of pressing the bit firmly on the wire.

★ ★ ★

Premature wear of the pivot of the bit holder is to be expected in all machines where lubrication is neglected.

Rural and Urban Wires for Telephone Distribution Systems

(*Continued from page* 1347)

to protect them from abrasion. To facilitate the operation of separating the conductors from the support wire at attachment and terminal points, wooden wedges are provided and these wedges are the only special tools involved in the installation of rural and urban wires. Fig. 11 shows the wedges in use.

★ ★ ★

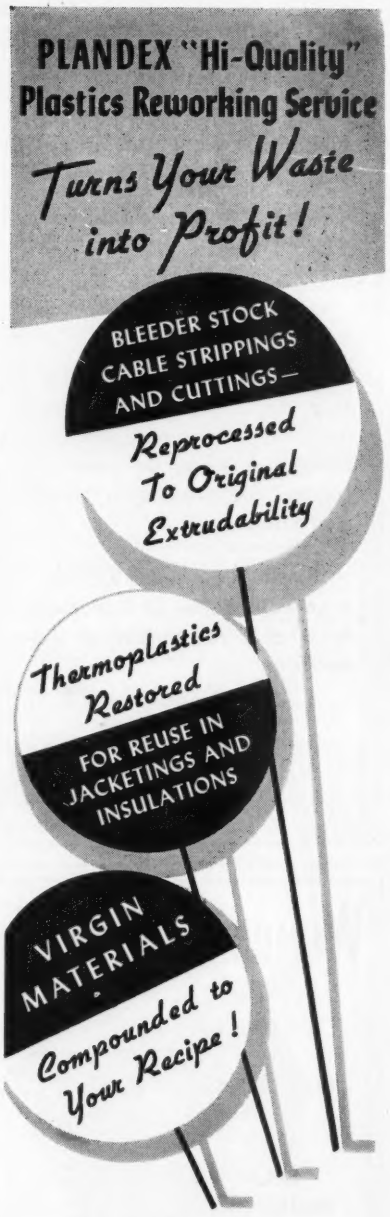
B Rural wire has now been used in large quantities and has acquired considerable service. It is attractive from the standpoint of low installed cost. B Urban Wire also is attractive from the standpoint of low installed cost, but it has had only limited field use to date. The sheathless feature common to both wires contributes also to low operating costs because of the ease of termination. However, the omission of the sheath deprives these wires of the various kinds of protection which a sheath affords. The rural wire has not experienced troubles resulting from such causes as weathering, lightning, abrasion or fatigue to any undue extent. It is expected that urban wire will not suffer unduly from the same trouble sources. Maintenance costs may be somewhat higher in the case of these wires than is encountered with more conventional installations, but it is not expected that over-all economy of rural or urban wire will be seriously affected.

Symposium on pH Measurement

Just what is the pH value? What are its restrictions and limitations? What is recommended standard practice? What about measuring pH at high temperatures and pressures, in non-aqueous solutions, and what is involved in instrumentation for pH measurements? These and other questions were either answered or greatly clarified at the Symposium on pH Measurement held in June, during the Annual Meeting of the **American Society for Testing Materials.**

★ ★ ★

According to **P. H. Bates** of the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National Bureau of Standards, Chairman of the Symposium Committee, the operational definition of pH—based on the observed difference of electromotive force of the pH cell when the standard reference solution is replaced by the test solution — has extended greatly the application of pH measurements but it has led to confusion in interpretation of these measurements. The term pH is therefore losing its precise meaning and becoming a synonym for "acidity."

★ ★ ★

W. R. Clark of Leeds & Northrup, described a number of types of commercial instruments for making pH and related emf measurements. He outlined the design characteristics of four basic types —the simple null-detector, the direct—coupled feedback amplifier, the null recorder, and chopper-type feedback stabilized type of instrument.

★ ★ ★

Henry Freiser of the University of Pittsburgh covered the various aspects of pH measurements as related to analytical chemistry. Specific reactions covered were the Bronstead, Lewis Acid-base reactions and oxidation-reduction reactions. He outlined the present state of the theory for calculating various physical - chemical constants based on these reactions.

★ ★ ★

The problems and theory of acidity measurements in non-aqueous media were covered by **Martin Kilpatrick** of Illinois Institute of Technology, and **M. A. Paul** of Harpur College (**F. A. Long,** Cornell University, co-author). Prof. Kilpatrick discussed emf and spectrophotometric methods. He pointed out that neither concentration nor activity (of hydrogen ions) is measured on a thermodynamic basis and the lack of clarity in definitions and assumptions in attempting to measure either concentration or activity of hydrogen ions in aqueous solutions has led to a great deal of confusion. In general, Prof. Kilpatrick brought up to date the state of the theory as presented by him at the 1946 Symposium on pH Measurement (STP 73).

This symposium, scheduled for publication later this year, may be considered an important permanent addition to the literature on pH measurement.

Porter Division Purchases Prentiss

The George W. Prentiss Co., Holyoke, Massachusetts, has been acquired by the **Riverside Metal Division, H. K. Porter Co., Inc.** Announcement was made by **W. Harvey Thompson,** Riverside's Vice President and General Manager, who stated that an expansion program was planned for the new acquisition. A multi-million dollar plant expansion program at the Riverside (New Jersey) plant is nearing completion.

★ ★ ★

Sales and operations of Prentiss Wire Mills will be combined with those of Riverside Metal Division under Mr. Thompson's direction. Prentiss products include drawn wire in both high and low carbon range, specialty wires from iron and steel, and non-ferrous wires in phosphor bronze, Monel and nickel silver. Prentiss, founded in 1857, serves the paper industry as well as the textile, garment and florist industries.

★ ★ ★

Riverside Metal Division manufactures high quality non-ferrous metals and alloys. It is the world's largest producer of phosphor bronze.

G.E. Develops New Resistor

A new Thyrite discharge varistor assembly which represents the first commercial offering of a voltage sensitive nonlinear resistor of its type—suitably mounted for direct installation in electrical circuits is announced by **General Electric's Metallurgical Products Dept.,** Detroit.

★ ★ ★

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Electroplating Wire of Small Dimensions

(*Continued from page* 1336)

supports resting on both sides of the 12" wide x 12" deep and 12' long steel tank. Hanging from the copper strips and connected to them by several copper leads were two more ⅛ x 1" copper strips 10' long, one on each side of the wire to be plated and separated from the wire by a space of approximately 2".

★ ★ ★

Figure 2 shows a shop set-up for plating copper wire .025" in diameter, 1000' long with .0002" thickness of zinc. This job was done for a manufacturer on an Army Ordnance Department contract. On the right side of Figure 2 is shown the payoff spool of wire which latter was being held taut so that it would not drag on the bottom of the tank. The operator at the left end of the picture was drying the plated wire while the one in the middle was inspecting the operation. This job has now been reduced to a one-man operation.

In Figure 1 is shown a ¼ H. P. motor plus a speed reducing set-up, consisting of two pulley reductions, one on either side of the Boston Speed Reducer, driving a take-up reel which pulls a strip of Manganin, 5/16" wide and .005" thick through a chromium plating solution at a speed which will permit the deposition of a plate of .00004" thickness on both sides of the 1000-foot-long strip. The method of determining the approximate speed is given below.

★ ★ ★

It requires 60 minutes to deposit a chromium plate of .001" thickness, so that a plate of .00004" thickness would require 2.4 minutes.

★ ★ ★

In a 12'-long tank, the auxiliary equipment would permit about 10' of wire to receive a plating deposit. The wire must, therefore, be drawn through the tank at the rate of 10 feet per 2.4 minutes or approximately 4 feet per minute. Having determined the speed required, then the R.P.M. of the motor, the reduction obtainable from the gear reducer and the diameter of the take-up reel being known, the pulley sizes remain the only values to be determined in the speed reduction train to secure the necessary speed of the wire through the solution.

★ ★ ★

Manganin is an alloy of copper, manganese and nickel, consisting of 85%, 12% and 3% respectively of these metals, and weighs approximately 2.87 pounds per 1000 lineal feet, in the dimensions cited in this example.

★ ★ ★

A Plater usually knows, or can quickly find out from a sample, how long it takes to deposit a plate of any kind and of any thickness upon a given type of wire.

★ ★ ★

Applying this knowledge to the sizes of his equipment, he quickly determines the set-up required for any plating job on materials of small dimensions.

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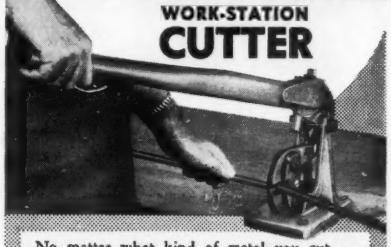

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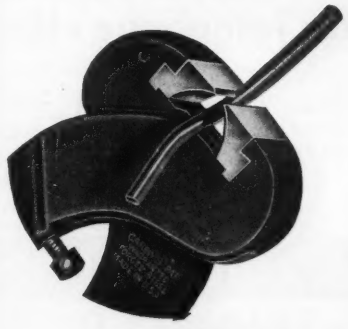

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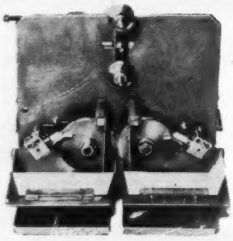

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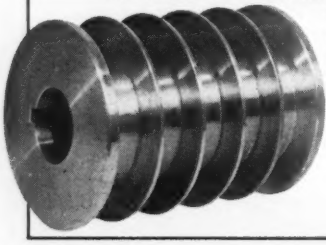

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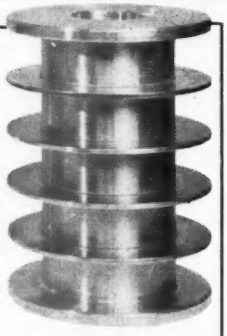

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Steel Wire: Some Recent Developments in Europe

(*Continued from page* 1330)

fume control in the shop, warm air being blown over the tanks and the fume removed by efficient extraction. Under full operation this plant, which carries 6 hooks each holding 4,000-lbs. of rods, is capable of an output of 25 tons per hour.

★ ★ ★

An unexpected difficulty has been the production of SO_3 fume from the Nordac evaporator which is equipped with oil fired submerged combustion burners. The removal of this fume has proved difficult.

Patenting

Good progress has been made with Patenting and cleaning in line, more especially with wire passed through tubular type furnaces. The problem of de-scaling, cleaning and coating of rods from large direct fired muffle furnaces is more difficult. In Warrington a 60 ft. furnace running 36 rods has been equipped with a continuous cleaning line and an attempt has been made, by welding the feed to the furnace, to produce coils of 1 ton weight. The blocks are 42" diam. and no difficulty has been experienced in stripping these large weight pieces by ram truck. Figure 5 shows a view of these large diameter blocks which are arranged in groups of eight so that a wide range of sizes can be dealt with at one time.

★ ★ ★

Much trouble has been experienced in removing scale mechanically but complete pickling has been obtained in hot 12% sulphuric acid contained in two 25 ft. long tanks. Lime and borax finishes have been tried and found unsatisfactory for one reason or another and latterly continuous phosphate coating has been introduced successfully.

★ ★ ★

Difficulties of dealing with a wide range of rod sizes and carbon contents of up to 0.85%—particularly weld breaks—have not yet been entirely overcome.

Galvanising

In Great Britain little wiped galvanised wire is produced, the great bulk being fully coated with coat weights equivalent to the American class "A" coatings. For rope wire a drawn galvanised finish is much in vogue and British Standards Institute have now standardised a range of coat weights of approximately half that of fully galvanised wire, for purposes where the life of the rope is not mainly concerned with corrosion. These wires are produced by Patenting, cleaning and fully hot galvanising in-line after which the wire is drawn to the appropriate size. A number of such units using electrically heated muffle furnaces are in successful production in Great Britain.

★ ★ ★

The static block has been applied to galvanising mild steel wire with complete success prompting the production of massive coils of wire for further processing.

Conclusion

I would like to thank The Wire Association for the invitation to present this paper and the Directors of Messrs. Rylands Brothers Limited and The Whitecross Company Limited, Warrington, for affording facilities for publication.

Versatile Plastisols Pace Wire Product Expansion

(*Continued from page* 1333)

Before committing himself to a plastisol supplier, the wire goods fabricator should become thoroughly familiar with the supplier's production procedures and quality control standards. These safeguards will help assure an attractive, corrosion-resistant coat—and a competitively-priced product combining sales appeal with outstanding performance.

Escambia Chemical Appointments

William F. Christie has been appointed Sales Representative for the Middle Atlantic States and **James J. Martin** New England Representative, it was announced by **Walter W. Peacock, Jr.,** Plastics Division Sales Manager of **Escambia Chemical Corp.,** 261 Madison Ave., New York City.

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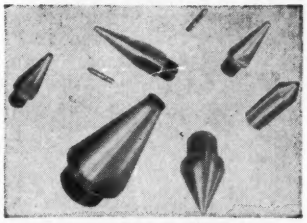

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Control Measures For The Heat Treatment of High Carbon Rods and Wire

(*Continued from page* 1326)

at 9.4 feet per minute. Sufficient testing was done at the time these standards were established to assure us that the wire was uniformly and adequately heated prior to the oil quench. These standards also provided sufficient time in the draw lead pan to obtain the mechanical properties required of all good quality oil tempered wire.

★ ★ ★

Our processing consists of preheating a bright cold drawn wire in molten lead at approximately 1150°F. then passing it into an open-flame, controlled-atmosphere, gas fired furnace to a work temperature of approximately 1620°F. The heated wire is then quenched in an oil bath at a temperature of 140°F. followed by a temper or draw lead bath in which the temperature is regulated so as to obtain the specified mechanical properties for a given size of wire. The bright drawn wire is processed using a minimum of lubricant, which is burnt off the wire during the time in the pre-heat lead bath. The atmosphere in the gas fired furnace is oxidizing. This oxidizing atmosphere varies with the unit size and is controlled in order to produce a thin tenacious scale which will not flake off during the coiling and forming operations. If this oxide finish is too heavy and friable, it flakes off in the fabricating machines causing scratching and galling which greatly reduces the life of the forming tools. Periodic checks are made at the entrance and exit zones of each of the two heating furnaces in order to maintain the prescribed air to gas ratio. After the tempering operation the wire is then passed through a water soluble oil which serves as a protective coating on the wire while in stock and in transit, and provides some lubrication to the spring maker during his forming operation.

★ ★ ★

As mentioned earlier an adequate soak temperature of the wire is necessary in order to have a properly heated wire section enter-

ing the oil quench bath. The quenching oil has a flash point of 475°F and is maintained at an operating temperature of 140°F. The oil is pumped from an underground storage tank through a series of water cooled tubes into the quench bath, and is then recirculated back through the system. Temperature is controlled by means of a thermocouple placed in the oil line just ahead of the point at which it enters the quench zone. The temper or draw lead pans are controlled to within 5° to 20°F with thermocouples immersed in the lead bath at two control points located between the sinker rolls.

★ ★ ★

The blocking of the wire in all sizes is difficult because of the stiffness of the wire and its resistance to taking a permanent set on the block. The wire must be secured to the block pins as the block is filled, and when the end of a coil reaches the block a sufficient number of rings from the next coil must be run onto the block and securely tied so as to eliminate the possibility of slippage of the coil being tempered. Any slippage occurring at this point, even if only for a few seconds, results in nonuniformity of heating, quenching, and tempering, and therefore is reflected in the mechanical properties of the wire at the spot at which this condition exists. This condition can be and is controlled by properly securing the coil to the block at all times so that no slippage occurs. After removal of the joint from each end of the coil, front and back end samples are taken for tensile testing, macroexamination, and jig testing. Uniformity of mechanical properties from coil to coil is essential on oil tempered wire so as to assure the customer receiving a product which requires a minimum of adjustment of his coiling machines and which will meet his spring specifications.

Conclusion

We have attempted in this paper to point out and discuss a few of the critical controls which must be exercised during annealing, patenting and oil tempering to insure economy of operation, and avoid costly rejections. When this is accomplished, an end product meeting all the customers' requirements is generally obtained. The aim of any quality control program should be to provide the utmost uniformity during performance in the customers' plants. We feel that the controls outlined in this paper are based on this aspect.

Ansonia Appoints Sales Executives

A. P. Lunt, President of **The Ansonia Wire & Cable Co.** has announced the appointment of **Walter G. Pearson** as Director of Sales and **Tilden E. Thompson** as Assistant Director of Sales.

★ ★ ★

Mr. Pearson has been associated with the Company more than six years in sales and sales engineering capacities, and brings to the department a wealth of knowledge and experience in the cable field.

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Mr. Thompson, formerly Home Office Sales Manager, has been with the Company for many years successfully fulfilling capacities of increasing responsibility in the selling organization.

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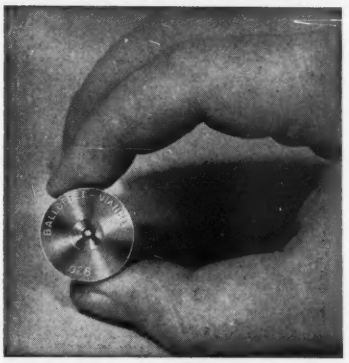

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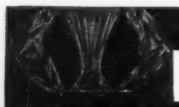
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Electronic Rubber Co., Stamford, Conn.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers Products Corporation, New York, N. Y.

COMPOUNDS—For Improving Drawing and Extrusion
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Metal Finishing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Electronic Rubber Company, Stamford, Conn.

COMPOUNDS—Phosphate Coating
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Rust Preventing
American Chemical Paint Co., Ambler, Pa.
American Lanolin Corporation, Lawrence, Mass.
Apex Alkali Products Co., Philadelphia, Pa.
Rome Soap Manufacturing Co., Rome, N. Y.

COMPOUNDS—Rust Removing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Magnuson Products Corporation, Brooklyn, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.

COMPOUNDS, Vinyl
Electronic Rubber Company, Stamford, Conn.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.

COMPOUNDS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Bick, Hans C., Inc., Reading, Pa.
Magnuson Products Corporation, Brooklyn, N. Y.
Miller, R. H. Co., Inc., Homer, N. Y.
Pennsylvania Salt Mfg. Company, Philadelphia, Pa.
Rome Soap Manufacturing Co., Rome, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.
Swift & Company, Chicago, Ill.
United States Borax & Chemical Corp., Pacific Coast Borax Co. Div., New York, N. Y.

CONDUCTORS—Flexible, Electrical
Montgomery Co., The, Windsor Locks, Conn.

CONTAINERS—Wire Packaging
(See DRUMS—Wire Packaging)

COPHOLDERS—Steel
Apco Mossberg Co., Attleboro, Mass.
Carter & Co., Ltd., B. & F., Bolton, England
Mossberg Pressed Steel Corp., Attleboro, Mass.
Plastic Mold & Engineering Co., Providence, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket. R. I.

CORDS—Electrical, Tinsel Conductor
Montgomery Co., The, Windsor Locks, Conn.

COUNTERS—
(See MACHINERY—Measuring Wire and Cable)

CRANES—Wire Mill
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CUTTING TOOLS—Carbide
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Metal Carbides Corporation, Youngstown, Ohio
Metallurgical Products Dept. of General Electric Co., Detroit.
Vascoloy-Ramet Corp., Waukegan, Ill.

CUTTING TOOLS—Wire
Porter, H. K., Inc., Somerville, Mass.
Robinson, M. W. Co., Rockfall, Conn.

DIAMONDS—Industrial
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Molina-Straus Diamond Products Co., New York, N. Y.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIAMOND POWDERS—
Danforth, The C. W. Co., Youngstown, Ohio
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Hyprez Div., Engis Equipment Co., Chicago, Ill.
Indiana Wire Die Co., Ft. Wayne, Ind.
Industrial Diamond Powders, Inc., Pittsburgh, Pa.
Kelly Wire Die Corp., New York, N. Y.
Molina-Straus Diamond Products Co., New York, N. Y.
National Research Company, St. Clair Shores, Mich.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Union Wire Die Corp., New York, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIAMOND POWDER RECLAIMING—
Danforth, The C. W. Co., Youngstown, Ohio
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Industrial Diamond Powders, Inc., Pittsburgh, Pa.
Kelly Wire Die Corp., New York, N. Y.
National Research Co., St. Clair Shores, Mich.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Union Wire Die Corp., New York, N. Y.

DIAMOND TOOLS—
Indiana Wire Die Co., Ft. Wayne, Ind.
Metal Carbides Corporation, Youngstown, Ohio
Molina-Straus Diamond Products Co., New York, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIES—Carbide, Tungsten & Tantalum
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Metallurgical Products Dept. of General Electric Co., Detroit
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Cranford, N. J.
Vascoloy-Ramet Corp., Waukegan, Ill.
Wayne Wire Die Co., Hillside, N. J.

DIES—Cold Heading
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Metal Carbides Corporation, Youngstown, Ohio
Metallurgical Products Dept. of General Electric Co., Detroit
Union Wire Die Corp., New York, N. Y.
Vascoloy-Ramet Corp., Waukegan, Ill.

DIES—Diamond
Ajax Industrial Supplies, Inc., Ft. Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Brenon, Inc., New Brunswick, N. J.
Ft. Wayne Wire Die, Inc., Fort Wayne, Ind.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
National Wire Die Co., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson, N.Y.
Union Wire Die Corp., New York, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIES DIAMOND—Drawing Angle Controlled
Hoosier Wire Die, Inc., Ft. Wayne, Ind.

DIES DIAMOND—Reversible
National Wire Die Co., New York, N. Y.

DIES—Extrusion
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Kelloy Corporation, New York, N. Y.
Metal Carbides Corporation, Youngstown, Ohio
Metallurgical Products Dept. of General Electric Co., Detroit
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIES—Eyelet
Eastern Carbide Corp., New Rochelle, N. Y.
Kelloy Corporation, New York, N. Y.

DIES—Nail, Nail Cutters, Feeder Blocks, Grippers, etc.
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

DIES—Pointing
Sjogren Tool and Machine Co., Auburn, Mass.

DIES—Repairs & Re-Cutting
Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc, New York, N. Y.
Brenon, Inc., New Brunswick, N. J.
Eastern Carbide Corp., New Rochelle, N. Y.
Ft. Wayne Wire Die., Inc., Fort Wayne, Ind.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

Metal Carbides Corporation, Youngstown, Ohio
Metallurgical Products Dept. of General Electric Co., Detroit.
National Wire Die Co., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Union Wire Die Corp., New York, N. Y.
Universal Wire Die Co., Cranford, N. J.
Vascoloy-Ramet Corp., Waukegan, Ill.
Wayne Wire Die Co., Hillside, N. J.

DIES—Special Shapes, Etc.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelloy Corporation, New York, N. Y.

DIES—Swaging
Sjogren Tool and Mach. Co., Inc., Auburn, Mass.

DIES—Tube Drawing
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Metallurgical Products Dept. of General Electric Co., Detroit
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Vascoloy-Ramet Corp., Waukegan, Ill.

DRAW BENCHES—
(See MACHINERY—Draw Benches)

DRIVES—Electric, Adjustable Speed
The Louis Allis Company, Milwaukee, Wisc.

DRUMS—Wire Packaging
Continental Can Company, Van Wert, Ohio

DRUMS & TRAVERSES—For Cable Reels
Hubbard Spool Co., Garrett, Ind.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio

DRYING EQUIPMENT
Carl Mayer Corp., The, Cleveland, Ohio
Industrial Ovens, Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.
Rockwell, W. S. Co., Fairfield, Conn.

ENGINEERS—Consulting
Insulating Mach'y—Entwistle, Jas. L., Co., Cranston, R. I.
Lubricants—Hans C. Bick, Inc., Reading, Pa.
Wire Mill—Clarence S. Arms, Worcester, Mass.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FOAM PRODUCING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Parkin Chemical Co., The, Pittsburgh, Pa.

FREQUENCY CHANGERS
The Louis Allis Company, Milwaukee, Wisc.

FURNACES—Brazing
Electric Furnace Co., Salem, Ohio
Rockwell, W. S. Co., Fairfield, Conn.

FURNACES—Galvanizing Equipment
Electric Furnace Co., Salem, Ohio
Rockwell, W. S. Co., Fairfield, Conn.
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Heat Treating
Carl Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Rockwell, W. S., Co., Fairfield, Conn.
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Lead Melting
Electric Furnace Co., Salem, Ohio
Rockwell, W. S. Co., Fairfield, Conn.

FURNACES—Resistance Heating, Strand
Trauwood Engineering Co., The, Cleveland, O.

FURNACES—Salt Bath
Electric Furnace Co., Salem, Ohio
Rockwell, W. S. Co., Fairfield, Conn.

FURNACES—Strand Annealing
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Trauwood Engineering Co., The, Cleveland, O.

GAUGES—Wire Diameter, Continuous
Industrial Gauges Corporation, West Englewood, N. J.

GALVANIZING EQUIPMENT — (See MACHINERY—Galvanizing Wire)

GEARMOTORS
The Louis Allis Company, Milwaukee, Wisc.

GRINDERS—Roll
Norton Co., The, Worcester, Mass.

GUIDES—For Wire
Heany Industrial Ceramic Corp., New Haven, Conn.

GUIDE TIPS—For Extruding Machines (See NOZZLES)

HAMMERS—Nail Heading
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

HAMMERS—Swaging
Sjogren Tool and Machine Co., Auburn, Mass.

HARDSURFACING ALLOYS—
(See Alloys—Hardsurfacing)

HOISTS—Electric Travelling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio

INHIBITORS—Pickling
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Parkin Chemical Co., The, Pittsburgh, Pa.

INKS—Printing, for Insulated Wire
Kellogg Company, M. W., Chemical Manufacturing Division, Jersey City, N. J.

INSULATING MATERIALS—
Celanese Corporation of America, New York, N. Y.
Chemical Products Co., E. Providence, R. I.
duPont de Nemours Co., (Inc.), E. I., Polychemical Dept., Wilmington, Delaware
Electronic Rubber Co., Stamford, Conn.
General Electric Company, Alkanex Wire Enamel Dept., Schenectady, N. Y.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
Plymouth Cordage Company, Plymouth, Mass
Shawinigan Resins Corporation, Springfield, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers Products Corporation, New York, N. Y.
United States Rubber Company, Naugatuck Chemical Division, New York, N. Y.

INSULATING MATERIALS—Paper (For Electric Wire Cable)
Plymouth Cordage Company, Plymouth, Mass.

LACQUERING SYSTEMS — See MACH.—Lacquering Electric Wire

LACQUERS—For Electric Wire
Chemical Products Co., E. Providence, R. I.

LAGGING—Reel
North Anson Reel Co., No. Anson, Me.

LAME—LAHN—
Montgomery Co., The, Windsor Locks, Conn.

LIME—
Warner Co., The, Philadelphia and Bellefonte, Pa.

LUBRICANTS — For Metal Cutting, Stamping and Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Bick, Hans C., Inc., Reading, Pa.
Magnuson Products Corporation, Brooklyn, N. Y.
Miller, R. H., Co., Inc., Homer, N. Y.
Rome Soap Mfg. Co., Rome, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.

LUBRICANTS—Wire Drawing
(See Compounds—Wire Drawing)

LUBRICANTS—Wire Rope
Bick, Hans C., Inc., Reading, Pa.
Swift & Co., Chicago, Ill.

MACHINERY—Armoring (Cable, Wire, Hose)
American Insulating Mach'y Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc., (used), Pawtucket, R. I.

MACHINERY—Barbed Wire
Glader Wm., Machine Works, Chicago, Ill.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Bobbin Winders
Cedar West Tool Inc., New York, N. Y.
Wire Equipment Mfg. Co., Trenton, N. J.

MACHINERY—Braiding
Carter & Co., Ltd., B. & F., Bolton, England.
New England Butt Co., Providence, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Bunching
Cook Manufacturing Co., The, Paterson, N. J.
Edmands Company, The, Cranston, R. I.
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Cable, Electric
American Insulating Mach'y Co., Phila., Pa.
Haskell-Dawes Machine Co Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Capstans (See Capstans and Machinery—Winding Wire)

MACHINERY— Centerless Grinding & Polishing
American Laubscher Corporation, New York, N Y.

MACHINERY—Chain Making
Nilson, A. H. Machine Co., Bridgeport, Conn.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Closing Rope
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N. J.

MACHINERY—Coiling Rod
Vaughn Mach'y Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Cold Heading
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Coil Wrapping (Paper)
McLaurin-Angier Co., Needham Heights, Mass.

MACHINERY—Copper Wire Drawing
American Insulating Mach'y Co., Phila., Pa.
National Mach'y Exch. (Used), New York
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Covering Wire (See MACHINERY—Insulating Wire)

MACHINERY—Cutting
Eisler Engineering Company, Newark, N. J.
Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool, Inc., New Haven, Conn.
Wells, Frank L., Co., Kenosha, Wisc.

MACHINERY—Descaling Rod, Dry
Fisher Associates, New York, N. Y.
Herborn, Herborn, Germany

MACHINERY—Die Making
Boulin, Victor J., Inc., New York, N. Y.
Dykrex Corp., Roos Tool & Mfg. Div., Newark, N. J.
Firth Sterling, Inc., Pittsburgh, Pa.
Metallurgical Products Dept. of General Electric Co., Detroit
Union Wire Die Corp., New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.

MACHINERY—Draw Benches
Morgan Construction Co., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Edging (See MACHINERY — Tandem Rolling and Edging Mills)

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Industrial Ovens, Inc., Cleveland, Ohio
Litzler, C. A., Co., Inc., Cleveland, Ohio

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

Michigan Oven, Company, Detroit, Mich.
Rockwell Co., W. S., Fairfield, Conn.

MACHINERY—Extruding

Davis-Standard Sales Corp., Mystic, Conn.
Entwistle Manufacturing Corporation, Providence, R. I.
Prodex Corp., Fords, N. J.
Royle, John, & Sons, Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Fence

Glader, Wm., Machine Works, Chicago, Ill.

MACHINERY—Flat Wire

Fenn Manufacturing Co., Newington, Conn.
Mettler Machine Tool, Inc., New Haven, Conn.
Rockwell, W. S., Company, Fairfield, Conn.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Forming Wire

Baird Machine Co., Stratford, Conn.
Nilson, A. H., Machine Co., Bridgeport, Conn.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Galvanizing Wire

Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee, Engr. Co., Cleveland, Ohio

MACHINERY—Gang Winders

Entwistle Manufacturing Corporation, Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding

Norton Co., The, Worcester, Mass.

MACHINERY—Insulating Wire

American Insulating Mach'y Co., Phila., Pa.
Davis-Standard Sales Corp., Mystic, Conn.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.
New England Butt Co., Providence, R. I.
Pourtier Père et Fils, Romainville (Seine), France
Royle, John & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lacquering Electric Wire

American Insulating Mach'y Co., Philadelphia.
Cook Mfg. Co., The, Paterson, N. J.
Industrial Ovens, Inc., Cleveland, O.
Michigan Oven Company, Detroit, Mich.

MACHINERY—Lock Washer

Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Looms, Wire Weaving

Cedar West Tool Inc., New York, N. Y.
E. V. G., Richard Kleinhans, New York, N. Y.
Maschinen & Stahl A. G., c/o Richard Kleinhans, Zurich, Switzerland
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Material Handling

(See Material Handling Equipment)

MACHINERY—Measuring Wire & Cable

Durant Mfg. Co., Milwaukee, Wis.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
New England Butt Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack

Baird Machine Co., The Stratford, Conn.
Glader, Wm., Machine Works, Chicago, Ill.
National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Packaging Wire

Coulter & McKenzie Machine Co., Bridgeport, Conn.

MACHINERY—Pin Making

Baird Machine Co., The, Stratford, Conn.

MACHINERY—Plating

Universal Industrial Equipment Co., Secaucus, N. J.

MACHINERY—Pointing

Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury Conn.

MACHINERY—Printing on Electric Wire

Gillies, Duncan M. Co., Inc., Boylston, Mass.

MACHINERY—Pumps for Molten Metal

Wire Equipment Mfg. Co., Trenton, N. J.

MACHINERY—Re-Spooling

Emory, Robert J., Co., Newark, N. J.
Federal Manufacturing Company, Wallingford, Conn.
International Wire Products Corp., Woodside Machinery Division, Midland Park, N. J.
National Mach'y Exch. (Used), New York
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.
Wire Equipment Mfg. Co., Trenton, N. J.
Wire Insulating Machinery Inc., Northboro, Mass.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Rod Mill

Fenn Manufacturing Co., Newington, Conn.
Morgan Construction Co., Worcester, Mass.

MACHINERY—Rolling Mill

Fenn Manufacturing Co., Newington, Conn.
Morgan Construction Co., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Rubber Insulating

Davis-Standard Sales Corp., Mystic, Conn.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Royle, John & Sons, Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Serving

Pourtier Père et Fils, Romainville (Seine), France
Wardwell Braiding Machine Co., Central Falls, R. I.

MACHINERY—Spark Testing

Entwistle, Jas. L., Co., Cranston, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Peschel Electronics, Inc., New Rochelle, N. Y.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Spring Making

National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany
Wells, Frank L., Co., Kenosha, Wisc.

MACHINERY—Staple

Nilson, A. H. Machine Co., Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Straightening & Cutting

Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool Co., New Haven, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Patterson Machine, Geo. C., Co., Cleveland, Ohio.
Wells, Frank L., Co., Kenosha, Wisc.

MACHINERY—Stranding

Carter & Co., Ltd., B. & F., Bolton, England
Haskell-Dawes Machine Co., Philadelphia, Pa.
Milton Machine Works, Inc., Milton, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Stripping Electric Wire & Cable

Burdwood, Howard A., Inc., Portland, Maine

MACHINERY—Swaging

Fenn Manufacturing Co., Newington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Take-Up and Pay-Out

American Insulating Mach'y Co., Phila., Pa.
Davis-Standard Sales Corp., Mystic, Conn.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Fenn Manufacturing Co., Newington, Conn.
Industrial Ovens, Inc., Cleveland, Ohio
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Standard Mill Supply Co., Pawtucket, R. I.
Trauwood Engineering Co., The, Cleveland, O.
Watson Machine Co., Paterson, N. J.
Wire Equipment Mfg. Co., Trenton, N. J.

MACHINERY—Taping

American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Pourtier Père et Fils, Romainville (Seine), France
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Testing Magnet Wire Coatings for Pin Holes

Peschel Electronics, Inc., New Rochelle, N. Y.

MACHINERY—Testing, Physical

Scott Testers, Inc., Providence, R. I.

MACHINERY—Tinning Wire

American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Universal Industrial Equipment Co., Secaucus, N. J.

MACHINERY—Tinsel Rolling Mills

American Insulating Mach'y Co., Phila., Pa.

MACHINERY—Trolley Wire

Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill, Cold Drawing

Mettler Machine Tool, Inc., New Haven, Conn.

MACHINERY—Turks Head

Fenn Manufacturing Co., Newington, Conn.

MACHINERY—Twinning

(See Mach.—Bunching)

MACHINERY—Twisters, Wire

Cook Manufacturing Co., The, Paterson, N. J.
Edmands Company, The, Cranston, R. I.
Haskell-Dawes Machine Co., Philadelphia, Pa.

MACHINERY—Used

National Machinery Exchange, New York, N. Y.
Wire & Textile Machy., Inc., Pawtucket, R. I.

MACHINERY—Welded Wire Mesh

E. V. G., Richard Kleinhans, New York, N. Y.
Maschinen & Stahl A. G., c/o Richard Kleinhans, Zurich, Switzerland

MACHINERY—for Wire Welding

(See WELDERS—Butt and Spot and Machinery —Welding Wire Fabrics)

MACHINERY—Winding Wire

Emory, Robert J., Newark, N. J.
Federal Manufacturing Company, Wallingford, Conn.
Fenn Manufacturing Co., Newington, Conn.
Hobbs Manufacturing Co., Worcester, Mass.
New England Butt Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.
Wire Equipment Mfg. Co., Trenton, N. J.
Wire Insulating Machinery Inc., Northboro, Mass.

MACHINERY—Wire Drawing

Cook Manufacturing Co., The, Paterson, N. J.
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Fenn Manufacturing Co., Newington, Conn.
Herborn, Herborn, Germany
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Morgan Construction Co., Worcester, Mass.
Morgardshammers Mek Verstads AB, Morgardshammer, Sweden
National Mach'y Exch. (Used), New York, N. Y.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, Ohio
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

MACHINERY—Wire Forming
Baird Machine Co., The, Stratford, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Nilson, A. H. Machine Co., Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Wire Rope
Carter & Co., Ltd., B. & F., Bolton, England
Milton Machine Works, Inc., Milton, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N. J.

MACHINERY—Wrapping with Paper
Larmuth (1947) Ltd., Swinton, England
Terkelsen Machine Co., Boston, Mass.

MATERIAL HANDLING EQUIPMENT—
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

MOTORS—Electric, A. C. & D. C.
The Louis Allis Company, Milwaukee, Wisc.

NAIL TOOLING—Tungsten Carbide
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

NAILS—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Brothers, Inc., Cortland, N. Y.

NIPPERS—Wire Cutting
Robinson, M. W. Co., Rockfall, Conn.

NOZZLES—For Extruding Machines
Wire Tool Div., Bridgeport Jig Boring Co., Bridgeport, Conn.

OVENS—Cable Lacquering and Enameling
American Insulating Mach'y Co., Phila., Pa.
Carl Mayer Corp., The, Cleveland, Ohio
Industrial Ovens, Inc., Cleveland, Ohio
Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.
Rockwell Co., W. S., Fairfield, Conn.

OVENS—Rod Bakers
Carl Mayer Corp., The, Cleveland, Ohio

OVENS—Welding Rod Coating
Carl Mayer Corp., The, Cleveland, Ohio
Industrial Ovens, Inc., Cleveland, Ohio
Litzler, C. A., Co., Inc., Cleveland, Ohio

PAINT BONDING CHEMICALS—
American Chemical Paint Co., Ambler, Pa.

PAINTS—Heat Resisting
American Chemical Paint Co., Ambler, Pa.

PAPER—Creped Wrapping
Arkell Safety Bag Company, New York, N. Y.
McLaurin-Angier Co., Needham Heights, Mass.
National Waterproof Papers, Inc., Beverly, N. J.
Terkelsen Machine Co., Boston, Mass.

PAPER—For Coil Wrapping and Corrosion Prevention
Arkell Safety Bag Company, New York, N. Y.
McLaurin-Angier Co., Needham Heights, Mass.
National Waterproof Papers, Inc., Beverly, N. J.
Terkelsen Machine Co., Boston, Mass.

PAPER—Insulating
Plymouth Cordage Company, Plymouth, Mass.

PATENT ATTORNEYS—
Lancaster, Allwine & Rommel, Washington, D. C.

PAY-OUT SYSTEMS—
(See MACHINERY—Take-Up & Pay-Out)

PHOSPHATE COATING CHEMICALS
(See COMPOUNDS—Phosphate Coating)

PICKLING COMPOUNDS—
See (Inhibitors—Pickling)

PLASTICIZERS—
Celanese Corporation of America, New York, N. Y.
Monsanto Chemical Company, Plastics Division, St. Louis, Mo.

PLASTICS COMPOUNDING — Custom
Electronic Rubber Company, Stamford, Conn.
Plandex Corporation, Downingtown, Pa.

PLASTICS—for Wire Insulation
Celanese Corporation of America, New York, N. Y.
duPont de Nemours Co., (Inc.), E. I., Polychemical Dept., Wilmington, Delaware
Electronic Rubber Co., Stamford, Conn.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
Plandex Corporation, Downingtown, Pa.
Shawinigan Resins Corporation, Springfield, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers Products Corporation, New York, N. Y.
United States Rubber Company, Naugatuck Chemical Division, New York, N. Y.

POINTING WIRE
Main, Robert A. & Sons, Inc., Paramus, N. J.

POTS—Lacquer
Industrial Ovens, Inc., Cleveland, Ohio

PRINTING WHEELS—for Electric Wire
Gillies, Duncan M. Co., Inc. Boylston, Mass.

PULLERS AND GRIPS—For Wire
Morgan Construction Co., Worcester, Mass.
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.
Sjogren Tool and Machine Co., Auburn, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, Ohio

PUMPS—Molten Metal
Fisher Associates, New York, N. Y.

REEL AND TENSION STANDS—
Industrial Ovens, Inc., Cleveland, Ohio
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Mill Supply Co., Pawtucket, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS & SPOOLS—Aluminum Alloy
Acrometal Products, Inc.,Minneapolis, Minn.
Hubbard Spool Co., Garrett, Ind.
Milton Machine Works, Inc., Milton, Pa.
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Annealing and Stranding
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Company The, Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Garrett, Ind.
Milton Machine Works, Inc., Milton, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio

REELS—Metal Bound
Durkee Mfg. Co. Inc., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
North Anson Reel Co., No. Anson, Me.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REELS—Plywood
Carris Reels, Inc., Rutland, Vt.
Hubbard Spool Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
Nelson Company, The, Baltimore, Md.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REELS & SPOOLS—Steel (All Types)
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Company The, Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L. Mfg. Co., Rockford, Ill.
Hubbard Spool Co., Garrett, Ind.
Mason Can Company, East Providence, R. I.
Milton Machine Works, Inc., Milton, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New York Engineering Co., New York, N. Y.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS—Wire Mill
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Company The, Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg. Co., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Durkee Mfg. Co. Inc., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
Mason Can Co., East Providence, R. I.
McCaskie, Inc., William, Westport, Mass.
Mettler Machine Tool, Inc., New Haven, Conn.
Milton Machine Works, Inc., Milton, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New York Engineering Company, New York, N. Y.
Nilson, A. H. Machine Co., Bridgeport, Conn.
North Anson Reel Co., No. Anson, Me.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Wood
American Woodworking Co., Chicago, Ill.
Bridge Mfg. Co., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Durkee Mfg. Co. Inc., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
Nelson Company, The, Baltimore, Md.
North Anson Reel Co., No. Anson, Me.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REFRACTORIES—High Temperature
Norton Company, Worcester, Mass.

ROD BAKERS—
(See OVENS—Rod Bakers)

RODS—Stainless Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Crucible Steel Co. of America, Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.

RODS—Wire—Non-Ferrous
Chase Brass & Copper Co., Waterbury, Conn.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Platt Bros. & Co., The, Waterbury, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Titan Metal Manufacturing Co., Bellefonte, Pa.

RODS—Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

ROPE—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Roebling's, John A. Sons Corp., Trenton, N. J.

RUST PROOF COMPOUNDS—
(See COMPOUNDS—RUST Preventing)

RUST REMOVING COMPOUNDS—
(See COMPOUNDS—Rust Preventing)

SATURATION SYSTEMS—
Industrial Ovens, Inc., Cleveland, Ohio
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

SOAPS—Industrial and Wire Drawing
(See COMPOUNDS—Wire Drawing)

SPOOLS—(See Reels & Spools)

SPOOLS—Braider, Wire
Plastic Mold & Engineering Co., Providence, R. I.

SPOOLS—Stamped Metal for Retail Wire Sales
Clark, J. L. Mfg. Co., Rockford, Ill.
Mason Can Company, East Providence, R. I.

STAMPINGS—Steel
Acrometal Products, Inc., Minneapolis, Minn.
Mossberg Pressed Steel Corp., Attleboro, Mass.

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Roebling's, John A. Sons Corp., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, O.

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TESTERS — INSULATION
(See MACHINERY—Spark Testers)

TESTING EQUIPMENT
(See MACHINERY Testing, Physical and Diameter Testing)

TINSEL—Electric Conductor
Montgomery Co., The, Windsor Locks, Conn.

TINSEL WIRE—Resistance, Lame, Decorative Cords Thread—Bare Copper Silver and False Gold Coated, etc.
(See TINSEL—Electric Conductor)

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

TOOLS—Nail Machine
Pittsburgh Carbide Die Co., Monongahela, Pa.
Wire Equipment Mfg. Co., Trenton, N. J.

TOOLS—Wire Cutting
Porter, H. K., Inc., Somerville, Mass.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

TRANSMISSIONS—Variable speed (See Adjustable Speed Drives)

TRAVERSES & DRUMS—For Reels
(See Drums & Traverses)

TRAVERSE MECHANISMS—
Apco Mossberg Co., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

VARNISHES & LACQUERS—for Electric Wire
Chemical Products Co., E. Providence, R. I.
General Electric Company, Alkanex Wire Enamel Dept., Schenectady, N. Y.
Shawinigan Resins Corporation, Springfield, Mass.

VULCANIZING PANS AND EQUIPMENT—
American Insulating Mach'y Co., Phila., Pa.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
Wire Insulating Machinery Inc., Northboro, Mass.

WELDERS—Spot and Butt and Welding Wire Fabrics
Eisler Engineering Corp., Newark, N. J.
Micro Products Co., Chicago, Ill.

WIRE—Aluminum
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Malin & Co., The, Cleveland, Ohio
National Standard Company, Niles, Mich.
Scovill Mfg. Co., Waterbury, Conn.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Barbed
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.

WIRE—Brass and Bronze
Chase Brass & Copper Co., Waterbury, Conn.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Scovill Mfg. Co., Waterbury, Conn.
Titan Metal Manufacturing Co., Bellefonte, Pa.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Bunched & Stranded, Copper
Camden Wire Co., Camden, N. Y.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.

WIRE—Cadmium
Stamford Processing Co., Peekskill, N. Y.

WIRE—Cast
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Cold Heading
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Camden Wire Co., Camden, N. Y.
Chase Brass & Copper Co., Waterbury, Conn.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Scovill Mfg. Co., Waterbury, Conn.
Sheffield Steel Corp., Kansas City, Mo.
Titan Metal Manufacturing Co., Bellefonte, Pa.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Copper
Camden Wire Co., Inc., Camden, N. Y.
Chase Brass & Copper Co., Waterbury, Conn.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
United Wire & Supply Corporation, Providence, R. I.

WIRE—For Electrical Conductors
Camden Wire Co., Camden, N. Y.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Flat, Fine
Montgomery Co., The, Windsor Locks, Conn.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Galvanized
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
National Standard Company, Niles, Mich.
Roebling's, John A. Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Manufacturers
Alloy Metal Wire Div., H. K. Porter Company, Inc., Prospect Park, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Keystone Steel & Wire Co., Peoria, Ill.
National Lock Washer Company, The, Newark, N. J.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Scovill Mfg. Co., Waterbury, Conn.
Sheffield Steel Corp., Kansas City, Mo.
Titan Metal Manufacturing Co., Bellefonte, Pa.
United Wire & Supply Corporation, Providence, R. I.
U. S. Steel Corp., N. Y., N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Metalizing
Stamford Processing Co., Peekskill, N. Y.

WIRE—Music
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Malin & Co., The, Cleveland, Ohio
National-Standard Company, Niles, Mich.
Worcester Wire Works Div., National-Standard Company, Worcester, Mass.

WIRE—Needle
Carpenter Steel Company, Webb Wire Division, New Brunswick, N. J.

WIRE—Nickel Alloy
Carpenter Steel Company, Webb Wire Division, New Brunswick, N. J.

WIRE—Nickel Silver and Phosphor Bronze
Alloy Metal Wire Div., H. K. Porter Company, Inc., Prospect Park, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Malin & Co., The, Cleveland, Ohio
Titan Metal Manufacturing Co., Bellefonte, Pa.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Oil Tempered
Crucible Steel Co. of America, Pittsburgh, Pa.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Pointed
Main, Robert A. & Sons, Inc., Paramus, N.J.

WIRE—Silver Plated Copper
Camden Wire Co., Camden, N. Y.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.

WIRE—Special Shapes
Alloy Metal Wire Div., H. K. Porter Company, Inc., Prospect Park, Pa.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
National Lock Washer Company, The, Newark, N. J.
Titan Metal Manufacturing Co., Bellefonte, Pa.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Spring
Alloy Metal Wire Div., H. K. Porter Company, Inc., Prospect Park, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Stainless Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Carpenter Steel Company, Webb Wire Division, New Brunswick, N. J.
Crucible Steel Co. of America, Pittsburgh, Pa.
Firth Sterling, Inc., Pittsburgh, Pa.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
National Lock Washer Company, The, Newark, N. J.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.

WIRE—Steel—Also Coppered and Galvanized Steel
Alloy Metal Wire Div., H. K. Porter Company, Inc., Prospect Park, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N J.
Sheffield Steel Corp., Kansas City, Mo.
U. S. Steel Export Co., New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Straightening and Cutting
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Tinned Copper
Camden Wire Co., Camden, N. Y.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.

WIRE—Zinc
Platt Bros. & Co., The, Waterbury, Conn.
Stamford Processing Co., Peekskill, N. Y.

WOOD—for Guide, Rolls, Bushings, Wear Parts, etc.

WRAPPING PAPER—Creped
(See PAPER—Creped Wrapping)

YARNS & TAPES—Insulating
Celanese Corporation of America, New York, N. Y.

YARN TESTERS—
Scott Testers, Inc., Providence, R. I.

The WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON 3, NEW JERSEY, U. S. A.

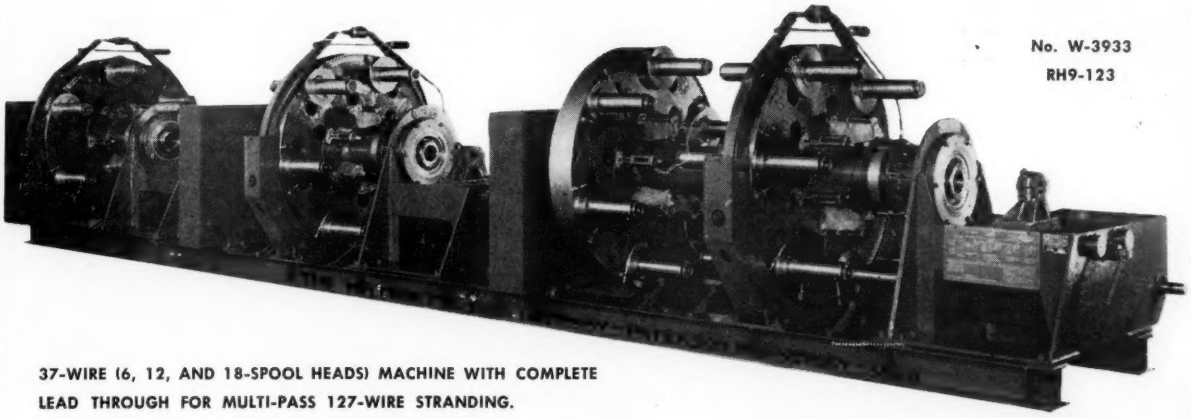
ELECTRICAL WIRE AND CABLE, WIRE ROPE, CORDAGE
AND MASTICATING MACHINERY MANUFACTURERS

WATSON

STRANDING HEADS TYPE "RH9"

THIS RIGID FRAME HORIZONTAL DESIGN IS THE INDUSTRY'S PREFERRED MEDIUM FOR PRODUCING SOFT COPPER AND ALUMINUM MULTIPLE-LAYER CONCENTRIC STRAND OF ROUND OR SECTOR SHAPE.

THE RH9 HEADS CARRY STEEL SPOOLS 22" FLANGE DIAMETER x 11" TRAVERSE x 5" DIAMETER BORE, OF 650-POUND COPPER WIRE CAPACITY.



No. W-3933
RH9-123

37-WIRE (6, 12, AND 18-SPOOL HEADS) MACHINE WITH COMPLETE LEAD THROUGH FOR MULTI-PASS 127-WIRE STRANDING.

WHEN COMPARED WITH PLANETARY MACHINES OF SIMILAR UTILITY, THE FOLLOWING ADVANTAGES ARE NOTEWORTHY: MUCH LOWER INITIAL COST, LESS FLOOR AREA REQUIRED, CONSIDERABLY HIGHER SPEEDS, GREATLY REDUCED LOADING TIME, LESS POWER REQUIRED, FEWER OPERATORS REQUIRED, AND MAINTENANCE IS PRACTICALLY NIL.

OPEN DESIGN, WITH OVERHUNG SPINDLE MOUNT, ALLOWS UTMOST FREEDOM AND RAPIDITY OF LOADING AND THREADING. ALL STEEL AND BALL BEARING THROUGHOUT. FULLY ENCLOSED AND FORCE-FEED LUBRICATED DRIVE AND CHANGE GEARING. AUTOMATIC ELECTRIC STOPS FURNISHED. SPRING-SET AIR-RELEASED BRAKES.

ROLL-OVER EQUIPMENT ON HEADS FOR PRE-SPIRALED (PREFORMED) SECTOR STRANDS PROVIDED WHEN SPECIFIED.

COMPLETE LEAD-THROUGH FOR MULTI-PASS STRANDING AND TANDEM ARRANGEMENT INSTALLED WHEN REQUIRED.

THIS DESIGN IS ALSO AVAILABLE IN SMALLER SIZES AND GROUPING, WITH AUXILIARIES TO MEET ANY PRACTICAL RIGID FRAME STRANDING REQUIREMENT.

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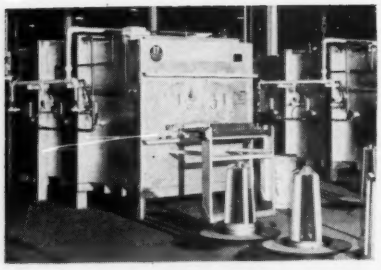
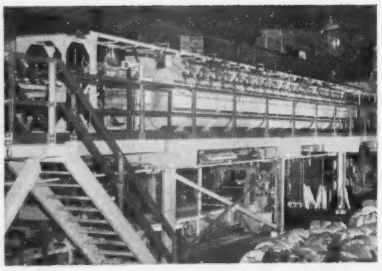
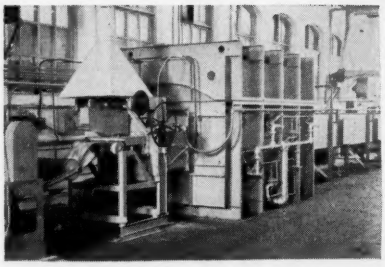


An EF multiple tube type furnace bright annealing stainless steel wire, continuously. One of an installation of five stainless steel furnaces we built in a prominent steel plant.



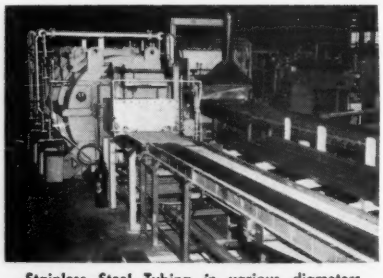
Large capacity EF gas fired furnace bright annealing stainless strip. We build them electrically heated or gas fired for wide or narrow strip, for single or multiple strands.



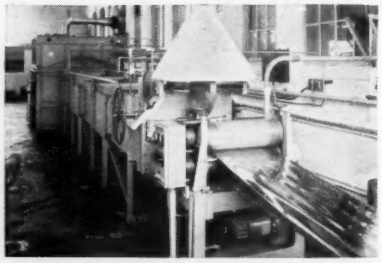
Stainless steel strip in various widths is bright annealed continuously in this EF gas fired special atmosphere installation equipped with an EF gas fired ammonia dissociator.

Bright Annealing Stainless

Tubing, Strip, Wire, Stampings and Other Stainless Steel Products



Stainless Steel Tubing in various diameters and lengths up to 24 feet is bright annealed continuously in this EF gas fired furnace.



Stainless Steel Strip. Wide, narrow and in various types, is uniformly bright annealed, continuously, in EF furnaces — any tonnage.

Stainless steel strip, wire, heavy and fine tubing, stampings, flatware, cooking ware, drawn and other stainless steel products, in many shapes and forms, are being bright annealed, uniformly, economically, continuously and with laboratory precision in EF furnaces of various sizes and types we have built.

Extensive experience with stainless steel problems, backed by over 40 years of practical furnace building experience and thousands of successful fuel fired and electric installations, enable EF engineers to design and build the best size and type of equipment needed for handling any product or production, or for any heat processing requirement.

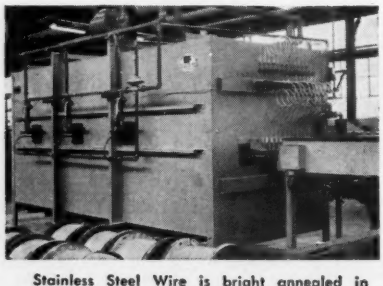
Submit your production furnace problems to experienced EF engineers — it pays.

THE ELECTRIC FURNACE CO.

GAS FIRED OIL FIRED AND ELECTRIC FURNACES FOR ANY PROCESS, PRODUCT OR PRODUCTION

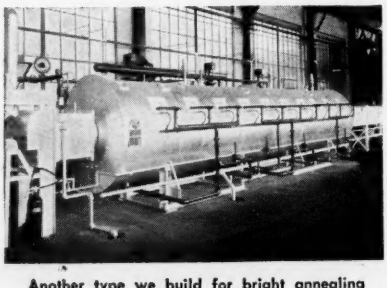
Salem - Ohio

Canadian Associates • Canefco Limited • Toronto 1, Canada



Stainless Steel Wire is bright annealed in this and other EF continuous and batch type gas fired and electric furnaces we build.

Stainless Steel Stampings, flatware, drawn and other products; large, small and in various shapes are bright annealed in EF furnaces



Another type we build for bright annealing stainless strip. This EF furnace also handles other grades requiring lower temperatures.